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CONTENTS

	PAGE
The Courtyard Cemetery at Tell El-'Ajjul, Palestine by OLGA TUFNELL	1
The Ground Beneath our Feet by I. W. CORNWALL	47
Thin Sections of Prehistoric Pottery: An Empirical Study by H. W. M. HODGES	58
Tree Ring Records from Britain by PORTIA WALLACE	69
Annual Report of the Institute for 1958-59	78
Annual Report of the Institute for 1959-60	91
Committee of Management and Staff	108

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The Courtyard Cemetery at Tell El-'Ajjul, Palestine

EXCAVATIONS OF 1931-1932

A type site reconsidered

By OLGA TUFNELL

Introduction

Thirty years have elapsed since the British School of Egyptian Archaeology under the leadership of Sir Flinders Petrie, assisted by J. L. Starkey, first began excavations at Tell el-'Ajjul in southern Palestine. The mound overlooks the silted estuary of the Wadi Ghazzeh, which in Bronze Age times would have provided the only natural haven for sea-going vessels between the Egyptian Delta and the Bay of Carmel; it is now some two miles inland and about four miles south-west of modern Gaza. Much denuded on its southern scarp by seasonal floods of the great watercourse, and partly obliterated on its western flanks by encroaching dune, the mound or 'tell' of 28-33 acres in extent, retains a roughly rectangular plan, despite the corrosive action of wind and water.

During five seasons of excavation nothing was found to suggest that the place was occupied during the Chalcolithic or Early Bronze Age, though an important settlement of the latter period was discovered by Starkey opposite, on the southern bank of the wadi. When this was abandoned or destroyed, the present site was perhaps chosen to control the highway between Syria and Egypt at its junction with the Spice Route from the east, in order to avoid the difficult going of the coastal dunes. The excavations of 1931-1935 only disclosed a fosse and revetment fortification dating from the Middle Bronze Age, and they revealed that the site achieved its greatest importance between the eighteenth and fifteenth or fourteenth centuries B.C. By the end of the Ramesside period, the present site of Gaza had become the main administrative centre, a position which it retained until recent times.

The earliest cemeteries discovered at 'Ajjul lay north and east of the mound. Petrie recognised at once that the grave-goods they contained were new to archaeology at that time, and he named the period the Copper Age, from the numbers of weapons made of that metal. He dated Cemeteries 1500 and 100-200 to the

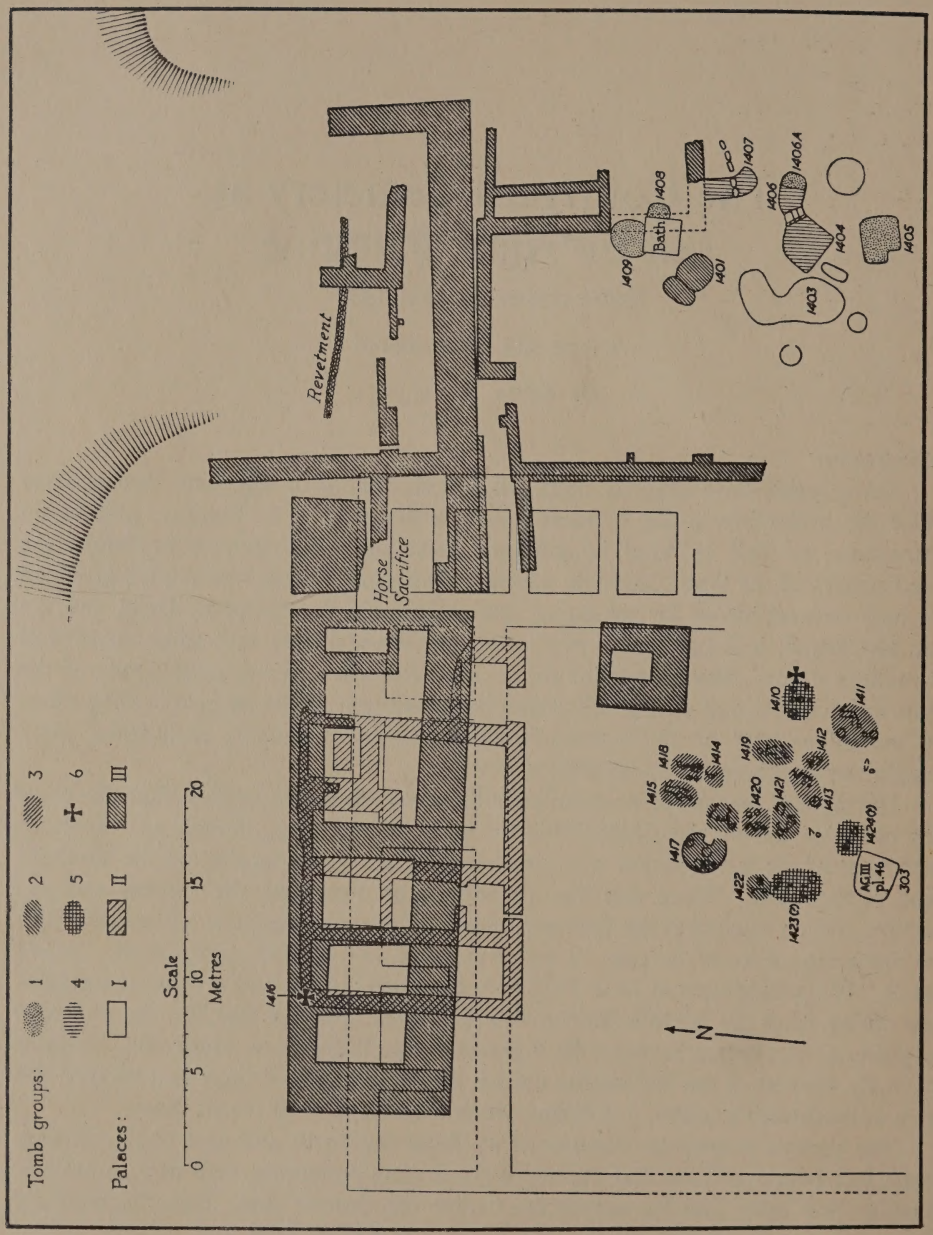


Fig. 1. Plan of Courtyard Cemetery and Palaces I-III on north end of Tell el-'Ajjul.

V-VI Egyptian dynasties, that is to say to the end of the Old Kingdom period, or, according to the now generally-accepted short chronology, *c.* 2300 B.C. Professor Albright's contemporary work at Tell Beit Mirsim produced the same forms of pottery jars, made partly by hand and wheel,[1] and more recent work at Lachish,[2] Jericho,[3] and beyond the Jordan[4] has shown that these newcomers often settled on the burnt debris of Early Bronze Age towns. The people of this Intermediate period do not seem to have built dwellings in stone during their first phases of settlement, though their masons were expert in quarrying it to make tombs.

At 'Ajjul and elsewhere, there is no clear evidence even now that the people of the Copper Age were in sedentary occupation of the area which later became a 'tell'. So far as we know, the first deposits on the north corner of the mound, were burials cut in the marl, and some large chambers penetrated to the underlying sandstone. Two main clusters are described in Petrie's publication, *Ancient Gaza II* (hereinafter referred to as *AG* II), the eastern tombs planned on Pl. XLVIII, and the western tombs planned on Pl. XLVI. The two groups are separated by a barren area coinciding with the head of an erosion valley on the north-west slope, already a problem to the builders of the first palace, who constructed a revetment at this point to counteract the threat to the foundations (for the relative positions of the tombs to the buildings, see Fig. 1). The lack of burials in the intervening ground is most likely due to erosion, and the two groups have come to be known together as 'The Courtyard Cemetery'. After three decades, the cemetery retains its importance as a type site, not exactly matched elsewhere, even at Jericho. In fact, it seems to end at about the time when MB deposits in the Jericho tombs of 1952-54 began, so that it appears worth-while to republish the material in order to extend the MB series backwards in time towards the Intermediate period; it might be at 'Ajjul, where both cultures are represented, that the elusive link between the two could be found.

Most of the collection has been described and redrawn thanks to the courtesy of Mr. Joseph Saad of the Palestine Archaeological Museum in Jerusalem, to Professor W. F. Grimes and Dr. K. M. Kenyon of the University of London, Institute of Archaeology, to the Directors of the Ashmolean Museum, Oxford, the Fitzwilliam Museum, Cambridge, and the University Museum, Manchester. I am also indebted to Mr. P. J. Parr, Mr. H. M. Stewart, and Mrs. M. E. Cox, who made the drawings.

Those who have had occasion to study the publication of Petrie's site will be grateful to Prof. W. F. Albright for his discussion of the 'Chronology of a South Palestinian City', published in 1938, which provides a useful scale of dating for the palaces and cemetery.[5] But he was handicapped by lack of adequate drawings and descriptions, and I hope to make good these deficiencies as far as possible for

his satisfaction and for the benefit of future scholars. Albright made comparisons between the Courtyard Cemetery and two other sites, Tell Beit Mirsim G-F, and Ras el-'Ain in the Plain of Sharon. Assessing the Courtyard Cemetery as one contemporary group of pottery and taking the four scarabs into consideration, he placed the group as a whole in the second half of the 18th century. Now that the characteristics of the various phases of the Middle Bronze Age are more closely defined, it is perhaps possible to place the tombs in a chronological series, and to recognise certain significant breaks in continuity; in the following pages I shall attempt to show how the material from the Courtyard Cemetery may fit into the still incomplete framework of the Middle Bronze Age.

Grave and Tomb Shapes

The majority of burials in the Courtyard Cemetery lay in shallow graves only a few inches below the surrounding marl; any shape they may once have had was lost by subsequent erosion. Only the earlier and more deeply cut tombs preserved their form, i.e. the somewhat rectangular shaft and chamber of Tomb 1408-1409, and—as a complete contrast—the circular bilobate chamber of Tomb 1417. The large and amorphous Tomb 1403 contained nothing but a brick sarcophagus, which was probably intended for a burial of LB II date. (Figs. 1-2).

Tombs 1408-1409 were more deeply cut into the sandstone than any others, and part of the group lays under the so-called 'bath'. There were two burials in Tomb 1409, and body I was disturbed and the long bones were stacked to make room for body II. The pottery mostly lay in the adjoining tomb or shaft 1408, divided from 1409 by a block of stones. To the south-east was the entry to Tomb 1407, which was covered by a palace wall based at 1004 ft. a.s.l. Petrie remarked that 'obviously Tombs 1407 and 1409 must have preceded the walls, but those walls are based only twenty inches above the marl'.[6] Petrie was inclined to associate the walls above the tombs with Palace III, but they seem more compatible in width with the walls of Palace II. It is only if the walls in question could be proved to belong to Palace I that a useful *terminus ad quem* would be achieved for the foundation of that building. The pottery of Tomb 1407, which seems to fall towards the end of the chronological sequence, would then gain significance in establishing the date of the last use of the Courtyard Cemetery. Though Albright agreed with Petrie that the burials must have taken place during a period of relative abandonment, he showed, partly from Petrie's own arguments, that most of the burials were made before the construction of any buildings on the mound.[7]

Tomb 1417 is interesting for its division into two parts by means of a well-cut pillar. The dromos or steps leading down to it are missing, but east of the entry lay the complete skeleton of an equid, described in the publication as a donkey.[8]

Tomb 1406 was divided from an adjoining chamber 1404 by a few bricks; the larger rectangular portion contained two pots, and the bodies in the northern part, Tomb 1406, were disposed as planned in *AG* II, Pl. LIV. In this paper, the child burial is classified with Group 1 because the only offering (Fig. 9: 6) would be out of place chronologically with the larger group, which falls in with Group 4.

Tomb 1416 was found beneath the corner of room MU, associated according to floor level with Palaces I, II, or III. Level 988 is recorded as that of the grave on the tomb card, and Starkey noted at the time that 'it probably belonged to the second plastered period' of the walls which enclosed it. In the publication, it is further stated that the burial was 'under the foundation of the first Hyksos palace', but this appears unlikely for the remaining wall height near room MU in Palace I ranges from 948-944 feet a.s.l.,[9] and the actual foundations were considerably lower.[10] Two alternatives seem possible: either (i) the burial was made at the time of the building of Palace II or shortly before it (MU walls at 1000-978 ft.) and was covered by a floor, or (ii) it was placed there between the abandonment of Palace II and the construction of Palace III (MU walls at 1094-995 ft.). In any case, it is the only burial which is definitely later than a building, and it therefore falls into a class apart, Group 6, outside the true range of the Courtyard Cemetery. For the evidence of the contents, see pp. 9 and 15.

Summary

It will be seen from the schedule above and the illustrations on Fig. 2 that the orientation of the bodies falls into groups which are consistent with the development of the pottery (Figs. 9-14). The earlier skeletons were placed on their sides, but from Group 2 onwards an extended position became more frequent. The warrior in Tomb 1417 lay on his back with his knees fallen wide apart, giving a macabre impression of a leaping man. It is manifestly difficult to achieve this position in life, and it seems that he was buried with his knees flexed and bound upright. Petrie considered that the attitude of the warrior 'is plainly that of death', and in particular he noted the position of the right arm in support of this opinion.[11] Could it not be, however, that this warrior and others like him, armed with a dagger and spear or axe, were buried ready and equipped for battle, the left hand resting on a dagger at the waist, and in the case of Tomb 1417 and of the upper burial in Tomb 303, with the right arm extended to hold a weapon of some kind? (Fig. 4).

The arms of the only undisturbed burial in Group 1 came up to the mouth, while the same position is adopted in another child burial, Tomb 1406A, which tips the balance in placing it at the end of Group 1 rather than at the beginning of Group 2. In general, and where this detail is clear, the arms of bodies in Groups

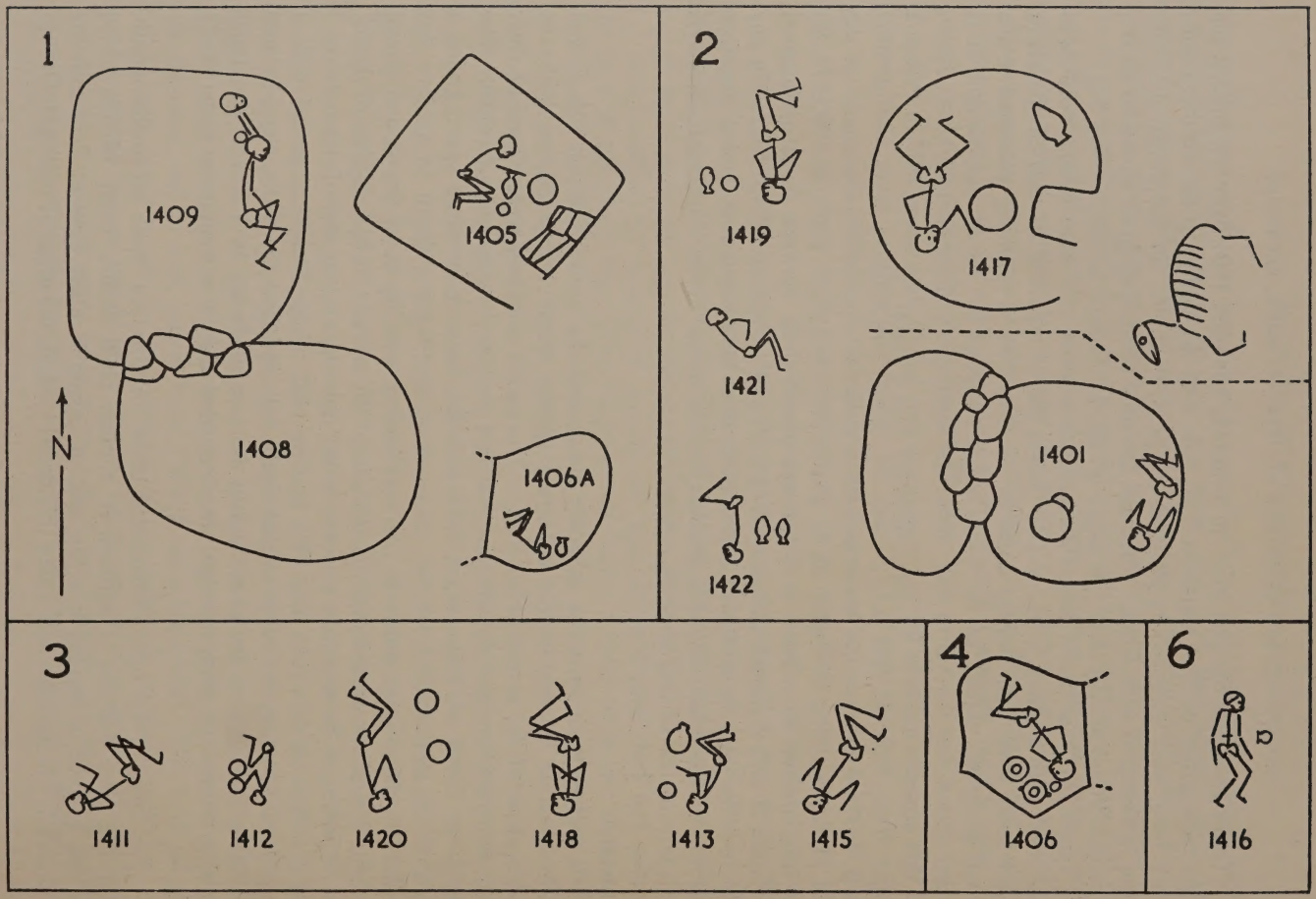


Fig. 2. The Courtyard Cemetery, Tell el-'Ajjul: orientation and attitude of burials, Groups 1-4 and 6.

ORIENTATION AND ATTITUDE OF BURIALS

Tomb	Level inches a.s.l.	Body Head	Facing	Position	Notes
1408	908	I NW	SE	Disturbed.	*AG* II, Pl. XLVIII, under 'bath'.
1409		II NE	E	On left side, legs flexed.	Body I displaced for Body II. Long bones of I stacked.
1405		NE	SW	Child (?), on l. side, legs, flexed.	*AG* II, Pl. XLVIII and LIV.
1406A	937	SE	NE	Child, on r. side, legs flexed.	*AG* II, Pls. XLVIII and LIV.
				GROUP 2	
1419	939	S	W	On back, legs flexed.	*AG* II, Pl. XLVI.
1422	936	S	W	Child, disturbed, legs flexed.	Copper (?) torque round neck.
1421	934	W	N	On l. side, legs flexed.	*AG* II, not marked.
1417	934	S	E	On back, legs flexed apart.	*AG* II, Pls. XLVI and XLVII.
1401	922	S	W	On back, legs flexed.	*AG* II, Pl. XLVIII entry from east through shaft blocked by stones.
				GROUP 3	
1411	939	SW	NW	On back, legs flexed.	*AG* II, Pl. XLVI.
1412	936	S	W	Child (?), disturbed.	*AG* II, Pl. XLVI.
1420	934	S	E	On r. side, legs flexed.	*AG* II, Pl. XLVI.
1418	934	S	W	On back, legs flexed.	*AG* II, Pl. XLVI.
1413	935	S	W	On l. side, legs flexed.	*AG* II, Pls. XLVI and XLVII.
1414	—	—	—	No body.	*AG* II, Pl. XLVI.
1415	927	SW	NE	On back, knees drawn up.	
				GROUP 4	
1407	—	—	—	Disturbed.	Entry from east, below line of stones based at 992 inches, and palace wall based at 1004 inches (see p. 4): *AG* II, Pl. XLVIII.
1404	937	—	—	Disturbed.	Divided from T.1406 by brick wall.
1406	937	SE	SW	On back, legs flexed.	*AG* II, Pl. LIV and XLVI, see also 1406 A in Group 1.
				GROUP 5	
1423	936	E	W	On back, legs flexed.	*AG* II, not marked.
1424	—	E	SW	Disturbed.	*AG* II, not marked.
1410A	939	E	N	Disturbed.	*AG* II, Pl. XLVI.
1410B	939	E	NE	Child.	*AG* II, Pl. XLVI.
				GROUP 6	
1410C	939	N	Up	Disturbed.	*AG* II, Pl. XLVI.
1416	988	N	S	On back, legs flexed, Child.	*AG* II, Pl. XLVI, rm. MU, grave not marked, see p. 5 and figs. 1-2).

NOTE: *Not all the tomb numbers are marked in the published plans, though it is usually possible to identify them. Where there is a discrepancy between the orientation entered on the field tomb cards and that of the published plans, the latter alternative is preferred.*

2 and 3 lie with elbows bent, free of the torso and hands raised at shoulder level. The bodies in Group 4 are disturbed in two cases out of three, and the position of the adult burial in Tomb 1406 is exceptional in orientation but the position of the arms, bent at the elbows, with hands resting on the chest resembles that of the body in Tomb 1418. Three out of four bodies in Group 5 are disturbed; though the heads are uniformly placed to the E, it is a question whether dismemberment of the dead was still practised in southern Palestine at this time.[12]

It is tempting to suggest that the child buried under a palace wall was placed there after a foundation sacrifice. This body in Tomb 1416 lay on its back, with legs and arms only slightly flexed. The head was to the north and faced east (see also pp. 9 and 15).

Comparisons

The position of the warrior in Tomb 1417—together with the torque worn by a child in Tomb 1422 nearby—demonstrates an affinity with a people named by Schaeffer '*Porteurs de Torques*'.[13] Both burials in Tomb 303 at 'Ajjul may have originally been placed with knees flexed upright,[14] and other bodies within Groups 2 and 3 show the legs flexed together and apparently fallen to one side.

Dr. Kenyon has noted this tendency at Jericho,[15] and it is also seen at the southern site of Tell el-Far'ah, both in the bilobate Tomb 1021,[16] and in the later loculi tombs at 'Ajjul, where—through lack of space perhaps—the legs were flexed with knees drawn up in the narrow alcoves.[17]

OFFERINGS

Summary

All told nearly eighty pots were associated with the Courtyard Cemetery, of which it is now possible to illustrate over sixty pieces. An average number of three vessels were with each burial; a dish or a bowl, often with the bones of meat offerings upon it, and a jar for liquid refreshment, which was obtainable by means of a small dipper flask placed nearby. Apart from a spread of animal bones representing the remains of a reserve supply of food, equipment for the afterlife could hardly have been more austere.

In the following sections, it will be seen that the pottery falls into six distinct groups, each one agreeing with certain changes in the orientation and attitude of the burials concerned. In addition to this important indication of some ethnic change in the population of a small cemetery, there is further evidence from the personal possessions which the dead carried with them to the grave.

The peoples of Groups 1 and 2 were either accomplished metal-workers, or had access to their products, though these weapons do not appear to derive from

those of the previous Intermediate Early Bronze-Middle Bronze or Copper Age (p. 1), when metal of greater purity was used. The socketed spear-head is a new introduction to Palestine at this time. No metal was found in the tombs of Group 3, though it was the people of this phase who produced the angular carinated bowls which are said to imitate metal prototypes and to reproduce the appearance of a metal surface by the application of slip and burnish.

With regard to dress and ornament, the toggle-pins are less massive than when they were introduced at Megiddo. They were certainly used to secure garments at waist or shoulder level, and it seems that the people of the Courtyard Cemetery were buried in normal daily dress, probably a length of cloth wound like a *dhoti* or *sari* and sometimes worn with one shoulder bare.

A string of greenish-blue glazed beads of graduated sizes came from the adult burial in Tomb 1406, where two scarabs were in position on the left wrist (Figs. 6-7), but the presence of these ornaments does not prove that a woman was buried in the grave. Two more scarabs came from disturbed burials in Groups 5-6, demonstrating that these seals only came into use towards the end of the period covered by the Courtyard Cemetery.

Apart, both in time and content, is the child's Tomb 1416, containing a calcite vessel, a gold frontlet in place upon the brow (Fig. 14:63-64), and a gold toggle-pin at the waist (Fig. 8). Toggle-pins of bronze or copper were in position on each shoulder.

THE POTTERY AND ITS PLACE IN MB CHRONOLOGY

Owing to lack of space, the detailed classification of pottery forms is omitted, though the progression can be followed by reference to the Inventory of Tombs beginning on p. 25.

Group 1

Group 1 consists of Tombs 1408, 1409, 1405. The first tomb group is fully illustrated (Fig. 9: 1-5), the second contained one cup of the same type as No. 2 and a toggle-pin which may be intrusive (Fig. 5). The contents of Tomb 1405 became available too late for inclusion in the classification, but are added to the illustrations under Nos. 5a to 5c. The dipper, No. 6, from a child's burial originally recorded with the adult burial in Tomb 1406 should belong to this early phase.

The ware tends to be coarse, containing large grits of uneven size; it has fired buff or brown. Dipper No. 4 was originally burnished over a dark red slip, though No. 6 shows no trace of surface finish. The jar, No. 5, is covered with an unusual matt red slip and bears an incised pot-mark on the shoulder (*cf.* Fig. 3). Except for the transitional No. 5a, the forms have a flattened base, a detail which seems to divide Group 1 from Group 2, where a flat or disk base is achieved.

Fig. 3. Storage jars with pot-marks. (*Cf* fig. 9: 5 & 9)
1 Tell el-'Ajjul (*AG* II, Pl. 32, Type 43 D^8) Tomb 1015
2 Megiddo (*M* II, Pl. 16: 10) near Tomb 5114.
(1/10)

Comparisons

The cup, No. 2 derives from the beakers and cups of the previous Intermediate Early Bronze-Middle Bronze Age or Caliciform culture. The earlier cups are placed in the general horizon of Tell Beit Mirsim H, Cemeteries 100-200 at 'Ajjul and Cemetery 2000 at Tell ed-Duweir.[18] They are altogether missing at Jericho and in Cemetery 1500 at 'Ajjul, though examples occur in the Shaft Tombs at Megiddo; it seems therefore that these cups develop fairly late in the Intermediate EB-MB series and follow through the still uncertain developments which lead into MB I; they form a significant class in the early MB tomb series at Megiddo.

2 Megiddo (OIP XXXIII (1938), Pl. 35:2) Shaft Tomb 912 B.
2 Megiddo (OIP XXXIII (1938), Pl. 28:26) Shaft Tomb 911 A1.
5 Ras el-'Ain (*QDAP* VI (1938) p.119, No. 102 and Pl. XXXI:7) Grave 5.
Tell el-'Ajjul (*AG* II, Pl: XXXII: 43 D^8) Tomb 1015.
Megiddo (*OIP* LXII (1948) Pl. 16:10) near Tomb 5114

Group 2

Group 2 consists of Tombs 1419, 1422, 1421, 1417 and 1401. Nos. 7-20 on Fig. 10 illustrate the forms as far as possible.

The ware tends to be reddish-brown, and there is an increase of slip and burnish. Besides the dippers, Nos. 8, 10, 13, 14, the cup No. 7 shows this hand finish which is also seen on the disk base. There are traces of radial burnish inside the platter, No. 15, which is a rare example of this early technique. The inverted and triangular rims of platters Nos. 12, 15, 19 are also reminiscent of EB forms. The first angular carinated bowl, No. 20, with its grooved

rim, flat base and unburnished surface, appears to end this group, and to divide it from Group 3, where the carinated bowls have lost the significant grooved rim, though it is not certain whether this detail should be considered as an early feature.

Among the dipper flasks, a gradual trend towards a less flattened base is seen in Nos. 13 and 14, and is followed by the first two dippers in Group 3. The storage jar, No. 16 has fine wheelmarks on a coarse light brown ware showing through in places where the cream slip has worn away. The rim is perhaps an early version of that which has come to be associated with Strata G-F at Tell Beit Mirsim. For a later development see No. 58.

Comparisons

The cup, No. 7 differs from No. 2 attributed to Group 1 in having a disk base. Similar cups occur at Ras el-'Ain, and in tombs attributed to MB I at Megiddo. The platters Nos. 12 and 15 are exceptionally large with diameters of 36 and 41.5 cms. respectively. The nearest comparisons for size come from Ras el-'Ain.[19] Albright considered that these large shallow bowls 'correspond perfectly to our G-F bowls, though the type lasted into D'.[20] There is nothing, however, actually drawn from those strata of this size or shape.

No. 20 marks the first appearance of the carinated bowl at 'Ajjul. Like most of those from Strata G-F at Tell Beit Mirsim, it has the characteristic grooved rim, but there are no others showing this groove in the Courtyard Cemetery. There are a few rim profiles of this kind from Ras el-'Ain, but they are apparently confined to the early part of the MB I series of tombs on the tell at Megiddo.[21]

The references given below show that Group 2 compares best with Ras el-'Ain, but characteristic elements at this site north-east of Jaffa in the coastal plain are missing in the Courtyard Cemetery, in particular the plain jars without handles, most of which have a flattened or a convex base, like the vessels in Group 1.[22] It follows that the main range at Ras el-'Ain may be slightly earlier than the pottery in Group 2.

7 Ras el-'Ain (*QDAP* VI (1938), 115, No. 69) Grave 2: MB I-II.
Megiddo (*M.* II, Pl. 14:36) Tombs 4016, 5074, 5130, 5147, 5171, 5176, 5186; Stratum XIV, MB I.
8 Megiddo (*M.* II, Pl. 13:3) Tombs 3148, 4046, 5275; Stratum XIV, MB I.
Ras el-'Ain (*QDAP* VI (1938), 109, No. 16) Stratum I.
10 Ras el-'Ain (*QDAP* V (1932), 123 No. 25).
Jericho (*JT* I Fig. 113:12), Tomb A.1.19, Dipper Type A.I.*a*, Group I.
16 Ras el-'Ain (*QDAP* V (1932), 123 No. 30): MB II.
Tell Beit Mirsim (*AASOR* XII, Pl. 46:8) Strata G-F: MB I.
(*AASOR* XIII, Pls. 22: 16-17, 20-22): Stratum *G* MB I.
Tell ed-Duweir (*Lachish* IV, 57, 221), MB glacis fill, NE 16/207, NE 13/223
19 Ras el-'Ain (*QDAP* V (1932), 122 No. 18): MB II.
20 Ras-el-'Ain (*QDAP* V (1932), 122 No. 4): MB II.
Tell Beit Mirsim (*AASOR* XIII, Pl. 4:5): Stratum G, MB I.

Group 3

Group 3 consists of Tombs 1411, 1412, 1420, 1418, 1413, 1414, 1415 (empty), illustrated by Nos. 21-34. Only one bowl from Tomb 1418, possibly similar to No. 28 has not been

traced. The contents of Tomb 1414 became available too late for inclusion in the classification of pottery, but are illustrated under Nos. 34a-34c.

The group is remarkable for its concentration of carinated bowls, Nos. 21, 24, 27, 31, 33 and 34a. All but No. 21 have a red-slipped surface outside and on the rim, which is burnished horizontally above the projecting keel and vertically towards the base. A point to be noted is that while the slip extends over the flat base of No. 24 and the disk base of No. 27, the burnish does not, an omission which is more understandable on Nos. 31 and 33, where a concave disk and an oblique ring base appear for the first time.

The bowl with two vertical handles, No. 22, has a strongly moulded rim which is unique in the Courtyard Cemetery. Like No. 20 it helps to mark the transition to Group 3, which is emphasised by the lack of grooved rims on the other carinated bowls, points which suggest that there may be a short interval in time between Groups 2 and 3.

The shoulder-handled jug No. 30, with traces of cream slip, is also unique both in form and finish. The jugs Nos. 32 and 34 are less distinguished; they belong to common families elsewhere but exact parallels have not been found.

The dipper flasks, Nos. 26, 29 retain a slip and burnish, but Nos. 23, and 29 (with tapering sides and roughly pointed base), herald a change to be fulfilled in Groups 4 and 5.

Comparisons

The handled bowl provides a link with Tell Beit Mirsim E, and the vase No. 25 shows a family resemblance to finer vessels from Ras el-'Ain and Wadi et-Tin.

An angular carinated bowl, with an everted but not a grooved rim, and with slip and burnish on the disk base was found on the rock-cut floor of Stratum 4 in Area D 3 at Hazor, and another came from the same locus, though attributed to Stratum 3.[23] Local Strata 4-3 in this area are equivalent to General Stratum V which represents the earliest phase of occupation so far discovered in the Lower Canaanite City.[24]

Contacts with Jericho are confined to early levels in Tombs 5 and 9 excavated by Professor Garstang between 1932-1936, and those with Lachish concern only some bowls from a late deposit in Cave 1513, Nos. 551-553, which have affinity with No. 20 in Group 2 and Nos. 21, 24, 27 in Group 3.

21 Jericho (*AAA* XX, Pl. XII:8), Tomb 4c.
22 Tell Beit Mirsim (*AASOR* XIII, Pl. 10:6), Stratum E
23 Jericho (*AAA* XX, Pl. XX:13), Tomb 5e.
24 Tell ed-Duweir (*Lachish* IV, Pl. 69:552), Tomb 1513: MB I.
Hazor (*Hazor* I, Pl. C:2), Locus 9010, Stratum 4: MB II.
25 Ras el-'Ain (*QDAP* V (1932), 125, No. 74 and Pl. LXVII): MB II.
Wadi et-Tin (*Revue Biblique* 54 (1947), Fig. 4:41, p.276): MB II.
27 Wadi et-Tin (*RB* 54 (1947), Fig. 6: 11, p.279): MB II.
Megiddo (*M.* II, Pl. 16:14), Tomb 5114; Stratum XIII B MB I.
31 Megiddo (*M.* II, Pl. 15:3), Tomb 5188: Stratum XIV MB I.

Group 4

Group 4 consists of Tombs 1407, 1404 and 1406, illustrated by Nos. 35-45. In addition, there was a shoulder-handled jar and a storage jar (Types 38 $C^{2''}$ and 43 D^{6}) both from

Tomb 1406. The dipper flask, originally listed with that tomb, belongs to a separate child burial and it is included in Group 1, No. 6

There is a marked break between Groups 3 and 4. The angular red-slipped carinated bowls have given place to a wider version of the same form, only slightly angular, and especially deep below the keel. The flat or disk base of Group 3, just becoming concave at the end of the series, is in Group 4 much more pronounced—almost splayed—and is deeply concave. Red slip and burnish has almost disappeared, except in the case of the only flared carinated bowl from the cemetery, No. 35. It should be a forerunner of the class which makes its appearance in phase 3 of Tomb A 34 at Jericho.[25] Only one dipper, No. 45 shows a brown slip, smoothly burnished, and the plump forms of the previous groups are displaced by elongated dippers with parallel or tapering sides and an angular shoulder.

Besides the first flared carinated bowl, the first piriform juglets appear; Nos. 36 and 41 have wide ovoid bodies decorated with irregular zigzags, comb applied, which are of the Yehudiyeh type. With them in Group 4 is the only undecorated elongated piriform No. 42. The miniature pithos, No. 37, is a rarity at all south Palestinian sites. Apart from the now damaged pricked Yehudiyeh juglets, it is the only piece to have a smooth grey or black surface, probably produced by the same kind of reducing kiln.

Comparisons

There are no significant comparisons in Group 4 with Tell Beit Mirsim. Though wide carinated bowls occur in Strata E-D, it will be seen either that the diameters at rim and keel are equal, or, that the bowl is wider at the rim, but this later tendency is not seen in any of the wide carinated bowls of Groups 4 and 5. Bowls of this class are rare at Jericho but the same tendency occurs;[26] in the single examples attributed to Groups I and II (i.e. Figs. 115 : 6 and 120 : 9) the keel projects, whereas at the end of Group III (Fig. 140:13), the bowl becomes wider at the rim. The evidence therefore seems to place 'Ajjul Groups 4 and 5 between Jericho Groups II and III in this respect, a point which is more precisely demonstrated in Group 5.

With regard to Megiddo there are few exact parallels. The elongated piriform, No. 42, is near in shape to those from that site, but it lacks burnish. The squat Yehudiyeh piriforms, Nos. 36 and 41 seem to derive from burnished forms, such as M. II Pl. 19: 25-26. Taking Group 4 as a whole, it may represent part of the little-known Stratum F at Mirsim, fill a gap in the Megiddo sequence occupied by a building level, and precede the main range of the Jericho sequence by a few decades.

42 Megiddo (*M.* II, Pl. 24:6), Tomb 2135; Stratum XII, MB II.
Jericho (*JT* I, Fig. 150:23), Tomb B 35. 352, Piriform Type F.2.*b*, Layer A Group III.
43 Jericho (*JT* I, Fig. 151:9), Tomb B 35. 283, Dipper Type C.1.*a*, Layer B Group III.
Megiddo (*M.* II, Pl. 26:3), Tomb 4099: Stratum XII, MB II.
44 Megiddo (*M.* II, Pl. 41:18), Tombs 3026, 4043; Stratum X, MB II.
Jericho (*JT* I, Fig. 170:22), Tomb J 9.30, Dipper Type G.1.*a*, Layer 2 Group IV.

Group 5

Group 5 consists of Tombs 1423, 1424, 1410 A and 1410 B. None of the contents of Tomb 1423 are available; it could perhaps have belonged to Groups 2-3 on the evidence of the platter and juglet, or to Group 5 on the similarity of the storage jar typed to the same form in the 'Ajjul volume as No. 57. The east orientation turns the scale in favour of Group 5 as it does also for 1410 B, in which there was no pottery.

The repertory of forms is the same as that in Group 4, and there is nothing to indicate a definite break between them as far as the pottery is concerned. Indeed, the wide carinated bowls, Nos. 46, 47, and 49 project more sharply at the keel than those in Group 4, which seems to bring them close in time to the red-slipped carinated bowls of Group 3. The dippers, Nos. 48, 55, and 56 do appear earlier in style than Nos. 43, 44, 45 with their more sharply pointed bases, but there is not much to choose between the periform juglets which all have a slightly convex button base. The comb-applied pricked decoration is carefully done especially on No. 52 within three zones delimited by plain vertical panels.

The storage jar, No. 57 is the logical development of No. 5 in Group 1, and No. 58 is clearly the descendant of No. 16 in Group 2. The shoulder-handled jar, No. 54, shares this feature in common with the jug, No. 30.

If it were not for the presence of the red-slipped flaring carinated bowl in Group 4, the tombs of which hang together on the eastern scarp of the valley, and more especially the style of the two scarabs in Group 4, it would be possible to place Group 5 slightly before Group 4. On balance, however, the present succession seems preferable.

Comparisons

The pottery of Group 5 provides sure contact with the 1952-54 Jericho tomb series. Platter No. 51 compares with one from the earliest phase of Tomb A 34, though it is noticeable that the wide carinated bowls Nos. 46, 47, 49 and 50 are not matched. The type is rare in Dr. Kenyon's and in Professor Garstang's tombs at Jericho. The two dippers, Nos. 55 and 56 with long and narrow necks are not present at Jericho, though the type analogous to No. 48 is found in all four phases of Tomb A 34. Both the piriform juglets Nos. 52 and 53 are matched in Phases 4 and 2 respectively.

Dr. Kenyon has shown that the excavated levels in Tomb A 34 represent in the main four occupational phases. She writes: 'the distinction between the different levels was not always very clear, particularly where Phase 4 directly overlay the similar buff fill of Phase 2, without the intervention of 3'.[27] The 'Ajjul assemblage may coincide with or follow Phase 1, but it is unlikely to be as late as Phase 2, because there are no ring bases on the piriform juglets, which are featured on three out of four piriform juglets from Phase 2. If a ring base is indeed an early detail, it is curious to find the development moving in inverse order to the progression of a ring base on the bowls which became more pronounced as time went on. 'Ajjul Group 5 cannot be as late as Phase 3, when the first cream slip flaring carinated bowl and the first lamp make their appearance in

Tomb A 34 at Jericho, to be followed in Phase 4 by the earliest version of the pedestal vase and almost the first cylindrical juglets. None of these forms occur in the tombs reviewed above, though a cylindrical juglet with a band of pricked design on the body came from the upper burial of Tomb 303, which should be considered as part of the Courtyard Cemetery. Dr. Kenyon's opinion that Phase 1 of Tomb A 34 'may be slightly earlier than the main range of Group I'[28] fits in well with the independent classification of the 'Ajjul pottery. Taking into account the uncertainty which exists for the stratigraphy of Phases 2 and 4, some types attributed to the last phase, and in particular the Yehudiyeh juglet Fig. 142:5 may span the gap between Phases 1 and 2, for it provides a parallel for No. 52, which is more elongated though it has the same convex button base, though the drawing makes it appear flatter than it is.

48 Jericho (*JT* I, Fig. 142:12), Tomb A 34.45, Dipper flask B.1.*a*, Level 2, Phase 4, Group III.
49 Jericho (*AAA* XX (1933), Pl. III; 1), Tomb 19c.
Tell Beit Mirsim (*AASOR* XIII, Pl. 12:3), Stratum D.
51 Jericho (*JT* I, Fig. 140:3), Tomb A 34.208, Platter A.1.*b*, Level 4b, Phase 1, Group III.
Megiddo (*M.* II, Pl. 29:20), Tombs 3145, 4099, 5067, 5267, Stratum XII.
52 Jericho (*JT* I, Fig. 142:5), Tomb A 34.191, Piriform juglet H.1.*b*, Level 2, Phase 4, Group III.
Byblos (*Byblos et l'Egypte* Pl. CXLVI: 914), Tombeau des Particuliers I-II.
Jericho (*AAA* XX, (1933), Pl. 20:10), Tomb 5f.
53 Jericho (*JT* I, Fig. 141:16), Tomb A 34.142, Piriform juglet F.1.*a*, Level 4, Phase 2, Group III.
Byblos (*Byblos et l'Egypte*, Pl. CXLVI: 919), Tombeau des Particuliers I-II.

Group 6

The north orientation of Burial C in the scatter of bones and pottery which made up Tomb 1410, together with the unfamiliar trend of No. 59 and jug No. 61, suggests that Burial C is the latest of the three. The group, however, is likely to be earlier than Tomb 1416, which is the only one connected with a building, possibly the foundation of Palace II (p. 8 f).

Comparisons

The only pottery offering, bowl No. 65, may provide a clue to a more precise date for Tomb 1416 in relation to Palaces II and III. This type of bowl with a plain rim and curved sides on a high ring base which rises to a small pedestal foot, is found in City Level III and in Palace I at 'Ajjul, and it does not appear to occur later.[29] It is therefore more reasonable to accept the first of the two alternatives offered on p. 5, namely that the burial was made before the building of Palace II, possibly as a foundation deposit.

Bowls similar to No. 65 occur at Ras Shamra, at Hazor and at Megiddo in contexts which precede the Late Bronze Age. On the other hand, there is only one bowl of this class from Jericho, which came from the top of Tomb A 38,[30] indicating that the type had a main range later than the Jericho sequence. Finally, there is a comparison from Structure I of the Fosse Temple at Lachish, but as it came from an early rubbish pit a Late Bronze Age I date is not essential.

65 Ras Shamra (*Ugaritica* II, Fig. 102:5), Ugarit Moyen 3, 1700-1650 B.C.
Hazor (*Hazor* II, Pl. CIX: 9), Area C, Locus 6199, Stratum 3: MB II.
Megiddo (*M.* II, Pl. 45:5), Tomb 4051, Stratum X.
Tell ed-Duweir (*Lachish* II, Pl. XXXVII B:3), Structure I: LB I.

ORNAMENTS AND WEAPONS

Group 1

The *toggle-pin* illustrated on Fig. 5:1 is one of a pair from the double burial in Tomb 1409. Using the late Mrs. Henschel-Simon's classification,[31] it compares with Type 3, *without head, plain,* and is the longest example from the Courtyard Cemetery, and the only object other than pottery in Group 1.

Group 2

More significant is the *torque*, No. 11 on Fig. 10, found on the neck of a child buried in Tomb 1422. Another ornament of this kind for a child was found in a later season.[32] A *toggle-pin* (not seen or illustrated) lay 'below the chin' of the body in Tomb 1419.

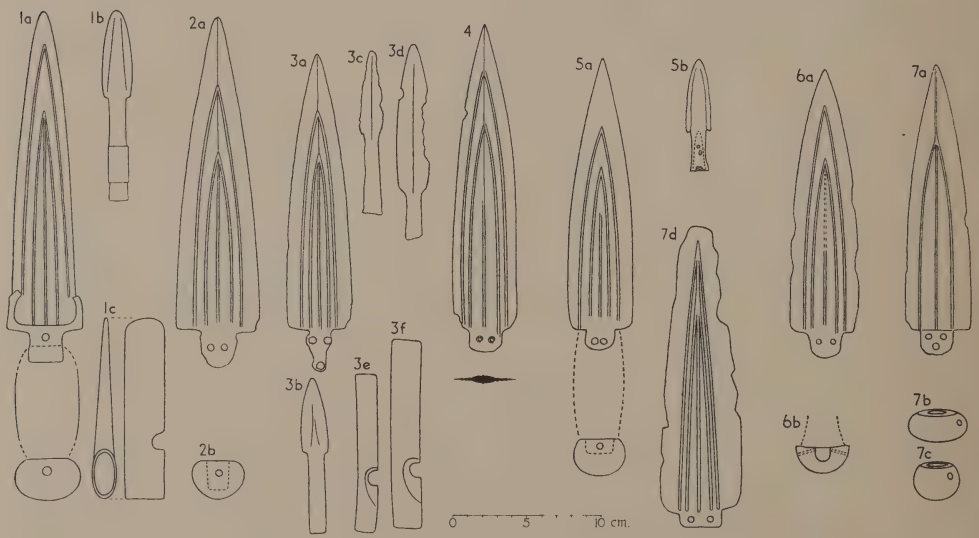


Fig. 4. Veined daggers and associated weapons from Palestinian sites

Tell el-'Ajjul.

1 *a* (*AG* II, 8, Pl. XIV:71) Tomb 1015: Dagger, 'wooden handle covered with sheet bronze'; white stone ball pommel.
b (*AG* II, 8, Pl. XIV:72) Tomb 1015: Two spear-heads.
c (*AG* II, 8, Pl. XIV:73) Tomb 1015: 'Narrow axe of Mesopotamian type'.

Megiddo Tombs
2 *a* (*MT*, 64-67, Pl. 118:5) Tomb 911 A 1: Bronze dagger.
b (*MT*, 64-67, Pl. 118:2) Tomb 911 A 1: Marble ball pommel.
3 *a* (*MT*), 67 f Fig. 171:6, Pl. 122:9) Tomb 911: Bronze dagger.
b-d (*MT*, Fig. 170:3-4, Pl. 122:5-7) Tomb 911: Three spear-heads.
e-f (*MT*), Fig. 173:1-2, Pl. 122:1-2) Tomb 911: Two axes.
Provenance unknown
4 Bought in Lebanon. Published by permission of the Royal Ontario Museum, Canada: Copper dagger.
Tell el-'Ajjul
5 *a* (*AG* III, 7, Pl. XIX:10) Tomb 303 C: Dagger 'characteristic of Caspian Caucasus'.
b (*AG* III, 7, Pl. XIX:9) Tomb 303 B: Spear-head.
Wady et-Tin
6 *a* (*Revue Biblique* 54 (1947), 278 ff., Pl. VII) Cave: Dagger.
b (*Revue Biblique* 54 (1947), 278 ff., Fig. 4:5) Cave: White calcite ball pommel.
c (*Revue Biblique* 54 (1947), 280 not illustrated): Lance-heads or javelins.
Gezer
7 *a* (*Gezer* I, 301 f. *Gezer* III, Pl. LX: 6): Dagger.
b-c (*Gezer* I, 301 f. *Gezer* III, Pl. LXI: 23, 24): Quartzite ball pommels.
7 *d* (*Gezer* I, 386, *Gezer* III, Pl. CXX:1) Tomb 226.

The groups of weapons are arranged according to the length of the daggers, the first two (23.5 cms. each) have one or two rivet holes respectively to haft the handle to the blade; the daggers 3 and 4 are only slightly less in length and have three and two rivet holes for the same purpose. It seems likely that this arrangement also conforms to an approximate chronological order, for it is noteworthy that piriform juglets do not occur among the pottery forms associated with 1-3, whereas they do appear in connection with 5-7. No. 4 is a dagger without provenance or associated objects. The dagger from the Courtyard Cemetery, Fig. 10:17, should come next in order; the blade measures 19 cms. after cleaning, and therefore conforms to the later examples of uniform length (19.5 cms.) which suggests that the craftsmen who made them worked to a standard size.

The *dagger,* No. 17 and the *spear-head,* No. 18 were the sole equipment of the warrior in Tomb 1417. The dagger was in position on the left hip, where the hand could have rested on the (?) wooden pommel, and the spear-head lay at some distance above and beyond the warrior's right arm, giving the impression that he was originally holding the intervening shaft. In Mrs. Maxwell-Hyslop's classification the 'Ajjul dagger belongs to Type 25.[33] This dagger with another similar blade of unknown provenance, Fig. 4, were subjected to analysis, for which I am indebted to Professor C. R. Tottle of the Department of Metallurgy, University of Manchester, and to Professor F. C. Thompson, who reported that both blades were made of impure copper which could not possibly be termed bronze.

Analysis of daggers

Fig.	*Locus*	*Copper**	*Tin*	*Lead*	*Arsenic*	*Iron*	*Nickel*	*Zinc*	*Silver*
10:17	T.1417	97.45	1.0	0.7	0.5	0.2	0.04	0.01	0.1
4:4	Unknown	96.09	0.01	0.7	1.5	1.0	0.10	0.5	0.1

*by difference

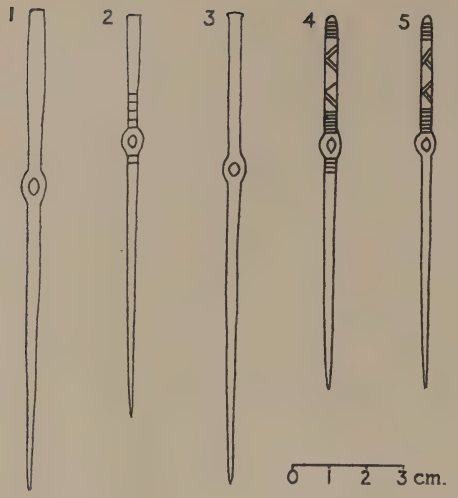


Fig. 5
Toggle-pins

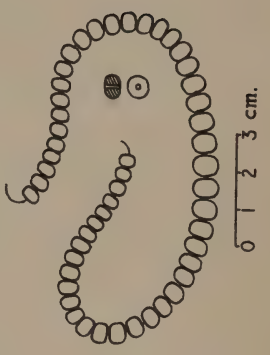


Fig. 6
Beads

	Tomb	Publication	Size in cms.	Condition	Field No.
		GROUP 1			
1	1409	(*AG* II, Pl. XVIII:203)	13.0	Complete: body I	1130
				body II	1131
	1419			Missing	1177
		GROUP 4			
2	1406	(*AG* II, Pl. XVIII:202)	10.8	Complete	1118
		GROUP 5			
3	1410 B	(*AG* II, Pl. XVIII:204. *cf.* photo in *QDAP* VI, Pl. LXIX:63)	12.7	Complete PAM 32.2098	1143
4	1410 B	(*AG* II, Pl. XVIII:205. *cf.* photo in *QDAP* VI, Pl. LXVIII:22)	9.9	Complete	1144
5	1410 B	(*AG* II, Pl. XVIII:206)	9.9	Complete	1144

GROUP 3

There were no small finds with the pottery of Group 3.

GROUP 4

Identical *toggle-pins,* of which one is illustrated on Fig. 5: 2 were in position, one on each clavicle of the body in Tomb 1406. They appear as Type 5, *without head, incised* in Mrs. Henschel-Simon's classification, and they have only the incisions on the shank to distinguish them from toggles of Type 3, though corrosion has no doubt hidden decoration on many pins of Type 3, which now appear to be plain. The greenish-blue glazed beads illustrated on Fig. 6 came from the same body, but the thread shown in the drawing is not original. They could be dated at any time between the XIth and XVIIth Egyptian dynasties, on the evidence of

comparable necklaces in the Edwards Library at University College, London. The two *scarabs*, Fig. 7: 1-2, came from the left wrist of the body in Tomb 1406.

GROUP 5

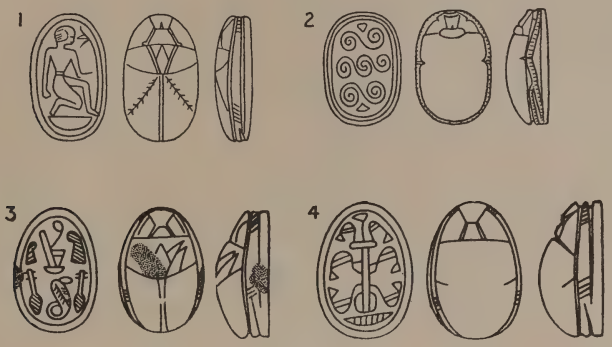


Fig. 7

Scarabs (1/1)

	Tomb	Description	Field No.
		GROUP 4	
1	1406	Steatite; white. *AG* II, Pl. VII: 103 (London, Institute of Archaeology E. XII 6/8) Base: deeply incised. Man kneeling on right knee, and holding long-stemmed lotus flower in left hand. *Neb* sign below. Type.—HC.3; EP.84 and sprays; Side 3 ?	1120
2	1406	Steatite; white. *AG* II, Pl. VII: 104 (London, Institute of Archaeology E. XII 6/9) Base: deeply incised. Three unconnected groups of round spirals, with rudimentary flowers at top and bottom. Type.—HC.8 EP. ? Side ?	1121
		GROUP 5	
3*	1410 B	Steatite; white. *AG* II, Pl. VII: 106 (Palestine Archaeological Museum 32.2100 RES 333) Base: deeply incised. In the centre are the crown of Lower Egypt on a *neb*, and a *uraeus*. On either side are *Maat*, 'truth', and *nefer* 'beauty' etc. Type.—HC.1; EP. 84; Side 13.	1145
		GROUP 6	
4*	1410 C	Steatite; white. *AG* II, Pl. VII: 105 (Palestine Archaeological Museum 32.2105 RES 363). Base: deeply incised. Above is a clump of papyrus, with the outer stems bound together; this is the emblem of Lower Egypt. Below is the symbol of the uniting of Upper and Lower Egypt (namely a lotus and a papyrus tied to the 'union' sign) over *neb*, 'lord', etc.; probably means something like 'the lord unites Upper and Lower Egypt'. Type.—HC.28; EP.21; Side 13.	1150

*The descriptions for Nos. 3 and 4 are taken from *A Catalogue of Egyptian Scarabs* by Alan Rave (Cairo 1936).

Fig. 5: 3 is a toggle-pin of Type 8a, *nail with flat head, plain* which was found with one (or possibly two) examples of Type 5. They were associated with the disturbed burials in T.1410, like the two scarabs on Fig. 7: 3-4.

GROUP 6

Fig. 8
Toggle-pin

1416 (*AG* II, Pl. III: 14) 4.1 Complete 1163

The ornaments of the child buried under a palace wall in Tomb 1416 were in position (Fig. 2). The gold *frontlet* (Fig. 14 : 64) measures 0.177 m. in length with a maximum width of 0.023 m.; it weighs 5.612 grammes. The gold *toggle-pin* (Fig. 8) measures 0.041 m. in length and weighs 1.729 grammes. It is classified with Mrs. Henschel-Simon's Type 6a, *Without head, ribbed regularly,* examples of which come almost exclusively from 'Ajjul and Megiddo in Late MB and LB I contexts. There were two small bronze toggle-pins, one on each shoulder, but they are now missing. The calcite *vase* (Fig. 14 : 63) lacks a base, which may have been cut off in the building operations for the next palace; the remaining height of the vase is 0.073 m.

CONCLUSIONS

IMPORTANCE OF THE COURTYARD CEMETERY

Of all the natural stages on the coastal road between Syria and Egypt, the sites of both Bronze Age and Iron Age Gaza, by virtue of their positions at the Mediterranean end of the Spice Route, were particularly exposed to additional

cross-currents between east and west. With the passage of time, the traces of these movements condense into a thin layer of town rubbish, or are reduced to deposits of pottery in funerary caves which have often been in use for centuries. Evidence from these sources can only provide an imprecise framework in which to work out the sequence of cultural change. It is therefore especially valuable to those engaged on this complicated task that the remaining graves of the much-eroded Courtyard Cemetery at 'Ajjul were occupied by over a score of single burials. The important result obtained from a re-assessment of the material is that it has been possible to distinguish separate groups, marked by changes in the inventory of ceramic forms developing in a logical sequence; each group is associated with tombs in which the attitude and orientation of the bodies conform—in general—to the independent classification of the pottery. It can therefore be said that the tombs discussed in the previous pages are those of successive peoples, burying their dead according to slightly different customs. There are breaks even in this short series, and they can be filled to some extent by discoveries at other places on the Syro-Palestinian littoral. Contact is likely with the Aegean world, but there is not space in this article to enlarge on this aspect and the briefest summary of the relationship of the Courtyard Cemetery to other sites must suffice.

GROUP 1. The characteristic feature is the method of finishing the bases of the vessels, which are not absolutely flat, and it is curious to find that a flat base presented a problem to potters who were throwing bowls and cups on the wheel, though to their predecessors of the Intermediate period working mostly by hand, the flat base was ubiquitous. The pottery may be slightly later than that of the Shaft Tombs and fall between Strata XV and XIV at Megiddo.

GROUP 2. The presence of a veined dagger, a socketed spear-head and a torque are reminiscent of Schaeffer's cultural group *'Porteurs de Torques'*.[34] Analysis of the dagger has shown that it was made of impure copper, whereas the larger and earlier daggers of the same type from the Shaft Tombs at Megiddo were made of bronze. Engberg considered that the source of Palestinian bronze was to be sought outside the country,[35] and it follows that the later veined daggers illustrated on Fig. 4 may also derive from weapons of foreign origin, though by the period of Group 2 they were made, perhaps, of local Palestinian metal.

The bilobate or kidney-shaped plan of Tomb 1417 is the earliest appearance of the shape in southern Palestine,[36] and comparisons are to be found in Crete, notably at Knossos in the Mavro-Spelis Cemetery, where the earliest deposits begin in MM II or III.[37] The attitude of the bodies in Cretan burials

at this time was also similar and a further point of contact is the presence of ostrich egg-shells in each.[38]

As far as the somewhat undistinguished pottery of Group 2 is concerned, the nearest parallels occur at Ras el-'Ain and at Megiddo Stratum XIV, though it lacks the characteristic forms of these two sites.

GROUP 3. Angular carinated bowls are the chief feature and they proclaim their dependence on metal prototypes, yet no objects of metal were associated with Group 3, suggesting perhaps, that it was in short supply. Angular carinated bowls were common at Tell Beit Mirsim G-F and at Ras el-'Ain, though the correspondence between them and the group under discussion is not perfect, because at those sites the bowls were normally finished with a grooved rim. If this detail proves to be an early feature, it would be better to allow for an earlier start at Ras el-'Ain and Mirsim G-F, falling between the burials of Groups 2 and 3. The occupation of the Lower Canaanite City at Hazor seems to be contemporary with Group 3, but there is only slight contact with the tombs of Megiddo Stratum XIII.

GROUP 4. There is a break in continuity between Groups 3 and 4; though the angular carinated bowl continued to be the principal form, it had changed in character. Because of its red slip and burnish identical with that of Group 3, the first flared carinated bowl, No. 35, cannot be placed later in the series. With it was the first of the piriform juglets from the site. They emphasise that a new phase had begun with a new style of decoration and a different method of firing, which produced a smooth grey or black ware. The priority of the piriform over the cylindrical shape of juglet was demonstrated years ago by Garstang at Jericho[39] and has since been confirmed by Kenyon at the same site.[40]

It seems that Group 4 may partially fill the gap represented at Mirsim by the largely denuded Stratum F, where the White Wash ware with painted decoration and rims of G-F or early E type may find its correct place.

The association in Tomb 1406 of a pricked piriform juglet and the two scarabs on Fig. 7: 1-2 is useful; both appear to be non-Egyptian in design and workmanship, and No. 2 in particular shows Aegean influence. A Late Middle Kingdom date for both would be possible. There is some contact with tombs of Stratum XII at Megiddo, but on the whole they precede Group 4 and help to fill the gap between it and Group 3. With regard to Jericho, only the lowest levels of Garstang's and Kenyon's tombs are matched in Group 4.

GROUP 5. Firmer contact is achieved between Group 5 and the 1952-54 tombs

at Jericho,[41] particularly in Tomb A 34, which in Dr. Kenyon's opinion precedes the main range of that cemetery in its lowest levels. The pottery assembled in her Groups I and II is therefore slightly later than the 'Ajjul Group 5.

With regard to Tell Beit Mirsim, Stratum E is not represented in Group 5; two at least of its four occupational phases may precede Group 5, and it may link with Group III at Jericho, though connections are closer with Group IV, particularly in the preponderance of pedestal vases with cordons at the neck.

The scarab, Fig. 7: 3 has lost precision in the cutting of the back and is strongly Egyptian in design, providing a variation of a theme which was popular in MB Palestine, commemorating perhaps the conquest of Lower Egypt and the Delta region by the 'Hyksos' or Retenu.

GROUP 6. The pottery of Tomb 1410C is not well matched elsewhere, but the scarab, Fig. 7: 4 symbolises in its plant design the Union of the Two Lands of Egypt, and may commemorate the next stage in the conquest.

The gold ornaments of a child buried under a Palace II wall heralds the most prosperous period at 'Ajjul, and should date either from the last years of the MB period or from the beginning of LB I around the first decades of the sixteenth century B.C.

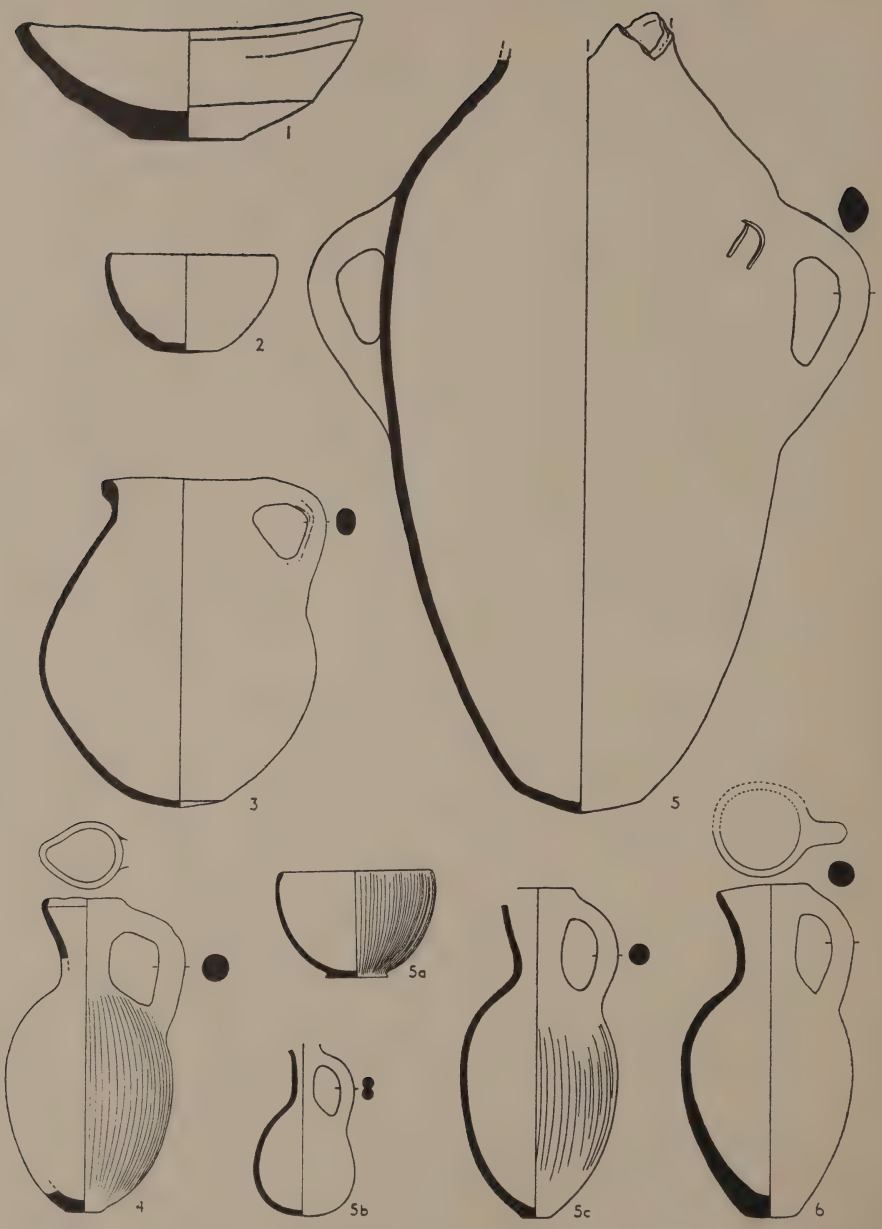


Fig. 9. The Courtyard Cemetery, Tell el-'Ajjul:
Group 1, Nos. 1-6 (1/5)

INVENTORY OF TOMBS

Fig. 9

GROUP 1

TOMB 1408

1 BOWL Platter A.1.*a* — not published 21 F — 1128
(Oxford, Ashmolean Museum 1932.1163)
WARE Buff, shading to brown, large grits, surface pocked and worn. Base repaired with lime patch.

2 BOWL Cup A.1.*a* — *AG* II, 20 T — 1129
(Oxford, Ashmolean Museum, 1932.1154)
WARE Buff, shading to brown, some grits, wheel-made, wet smoothed.

3 JUG Round mouth A.1.*a* — *CPP*, 56 E^2 — 1127
(Oxford, Ashmolean Museum 1932.1155)
WARE Buff, shading to brown, some grits. Soft fire. Wheel-marks outside.

4 JUGLET Dipper A.1.*a* — *AG* II, 35 R — 1126
(Oxford, Ashmolean Museum 1932.1162)
WARE Reddish-brown under traces of dark red slip, vertically hand-burnished.

5 JAR STORAGE Elongated A.1.*a* — *AG* II, 43 E^7 — 1125
(Oxford, Ashmolean Museum 1932.1183)
WARE Coarse brown, grey core, many grits. Medium fire. Matt red slip. Potmark at shoulder level incised before firing.

TOMB 1409

— BOWL Cup — *AG* II, 20 T — not kept

— METAL Toggle-pins (Fig. 5) — *AG* II, Pl. XVIII:203 — 1130-31

TOMB 1405

5a BOWL Cup A.1.*b* — *AG* II, 20 U — 1107
(Manchester, University Museum 9164)
WARE Buff, shading to brown, wheel-made, pronounced wheel-marks, though they are partly effaced by traces of vertical burnish. No trace of slip.

— JUG — *AG* II, 37 J^8 — 1104
(Manchester, not found)

5b JUGLET — *AG* II, 76 X^1 — 1106
(Manchester, University Museum 9165)
WARE Pinkish-buff, many white grits. Surface worn and pocked, covered with thick lime deposit. Twin handle, rim missing.

5c JUGLET Dipper — *AG* II, 35 R^2 — 1105
(Manchester, University Museum 9163)
WARE Reddish-brown, many white grits. Wheel-made. Reddish slip, with traces of vertical hand-burnish on upper part. Wheel-marks more visible on lower half. Part of pinched mouth missing.

TOMB 1406 A (Child burial)

6 JUGLET Dipper A.2.*a* — *AG* II, 35 R — 1115
(London, Institute of Archaeology E.XII 6/2)
WARE Coarse buffish-brown, some black and white grits. Medium fire. No trace of slip or burnish.

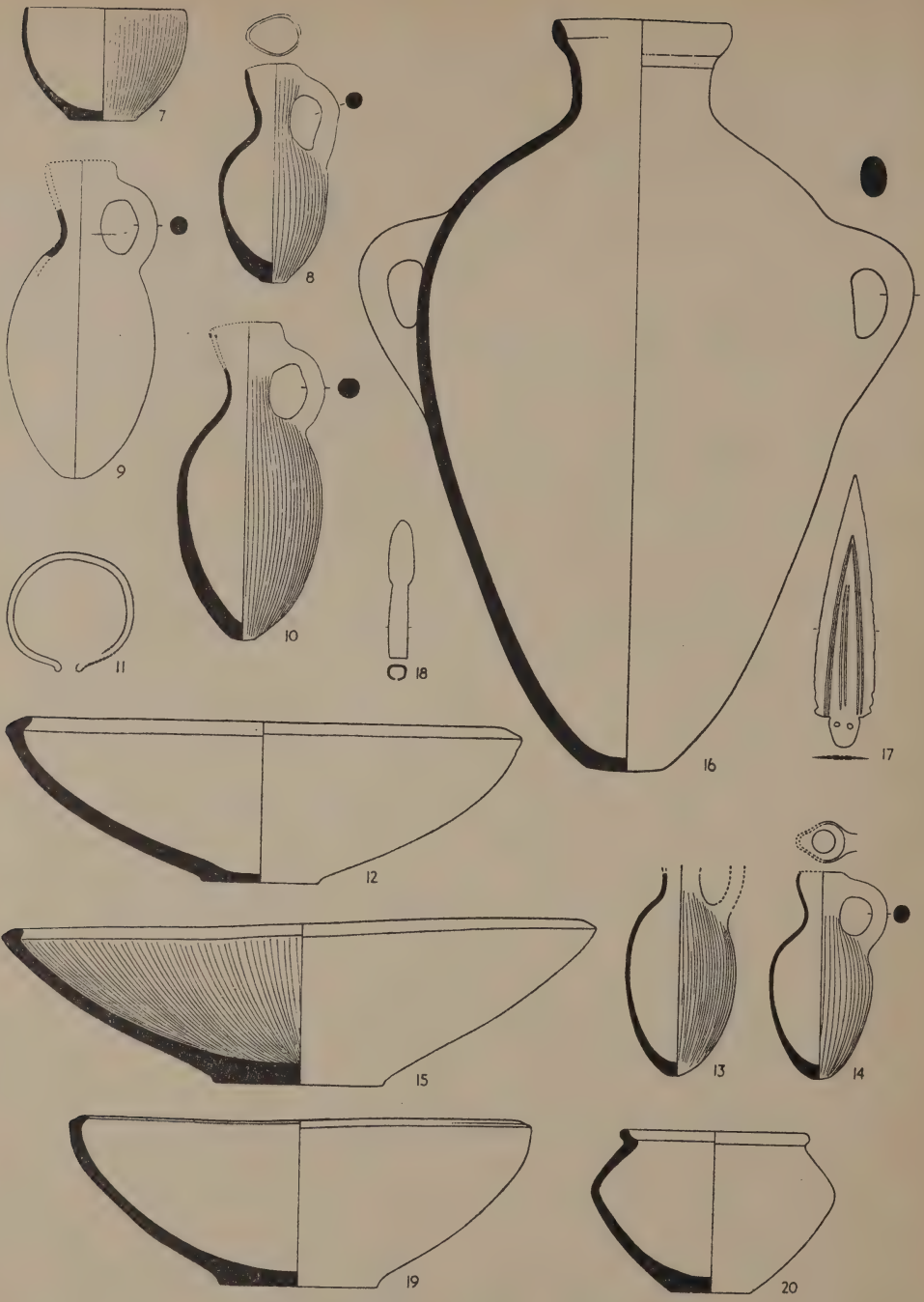


Fig. 10. The Courtyard Cemetery, Tell el-'Ajjul: Group 2, Nos. 7-20. (1/5)

Fig. 10
GROUP 2

TOMB 1419

7 BOWL Cup A.1.*b* *AG* II, 20 U 1175
(London, Institute of Archaeology E.XII 10/1)
WARE Brown. Medium fire. Hand-made, but wheel-finished (?) outside, brown slip (?). Traces vertical hand-burnish outside, including disk base.

— BOWL Platter *AG* II, 21 M^3 1174
(not kept)

8 JUGLET Dipper A.3.*a* *AG* II, 51 Y 1176
(London, Institute of Archaeology E.XII 10/2)
WARE Reddish-brown. Medium fire. Thick red slip, vertical hand-burnish all over.

METAL Toggle-pin 1177
(not kept)

TOMB 1422

9 JUGLET Dipper A.4.*a* *AG* II, 35 R^2 1186
(London, Institute of Archaeology E.XII 9/1a)
WARE Reddish-brown. Medium fire. Surface worn.

10 JUGLET Dipper A.4.*a* *AG* II, 35 R^2 1185
(London, Institute of Archaeology E.XII 9/1b)
WARE Reddish-brown. Medium fire. Thick red slip, strokes vertical hand-burnish.

11 METAL Bronze (?) torque *AG* II, pl. XV:85 1187

TOMB 1421

12 BOWL Platter A.2.*b* *AG* II, 21 X^2 1184
(London, Institute of Archaeology E.XII 5/1)
WARE Reddish-brown. Soft fire. Surface worn.

13 JUGLET Dipper A.5.*f* *AG* II, 51 Y 1183
(London, Institute of Archaeology E.XII 5/2)
WARE Reddish-brown. Medium fire. Thick red slip, traces of burnish. Surface worn and base flattened.

— JAR STORAGE *AG* II, 43 E^4 1182
cf. No. 16 (not kept)

TOMB 1417

14 JUGLET Dipper A.6.*f* *AG* II, 51 Y 1168
(London, Institute of Archaeology E.XII 3/2)
WARE Reddish-brown. Medium fire. Thick red slip outside and vertical hand-burnish.

15 BOWL Platter A.2.*b* *AG* II, 21 M^3 1166
(London, Institute of Archaeology E.XII 3/1)
WARE Coarse brown with grits. Traces of radial burnish inside only. Surface worn.

16 JAR STORAGE Ovoid A.2.*a* *AG* II, 43 E^4 1167
(London, Institute of Archaeology E.XII 3/4)
WARE Coarse light brown with large uneven grits. Very soft fire. Fine wheel marks showing through cream slip.

17 METAL Copper dagger (*cf.* Fig 4) *AG* II, Pl. XIV:74 1169
(London, Institute of Archaeology E.XII 13/3)

18 METAL Bronze or copper spear-head *AG* II, Pl. XIV:75 1170
(Not found)

TOMB 1401

19 BOWL Platter A.3.*b* *AG* II, 21 X^2 1100
(London, Institute of Archaeology E.XII 1/1)
WARE Reddish-brown. Medium fire.

20 BOWL Carinated, angular A.1.*d* *AG* II, 28 P^3 1101
(London, Institute of Archaeology E.XII 1/2)
WARE Reddish-brown. Soft fire. Pronounced wheel-marks below keel.

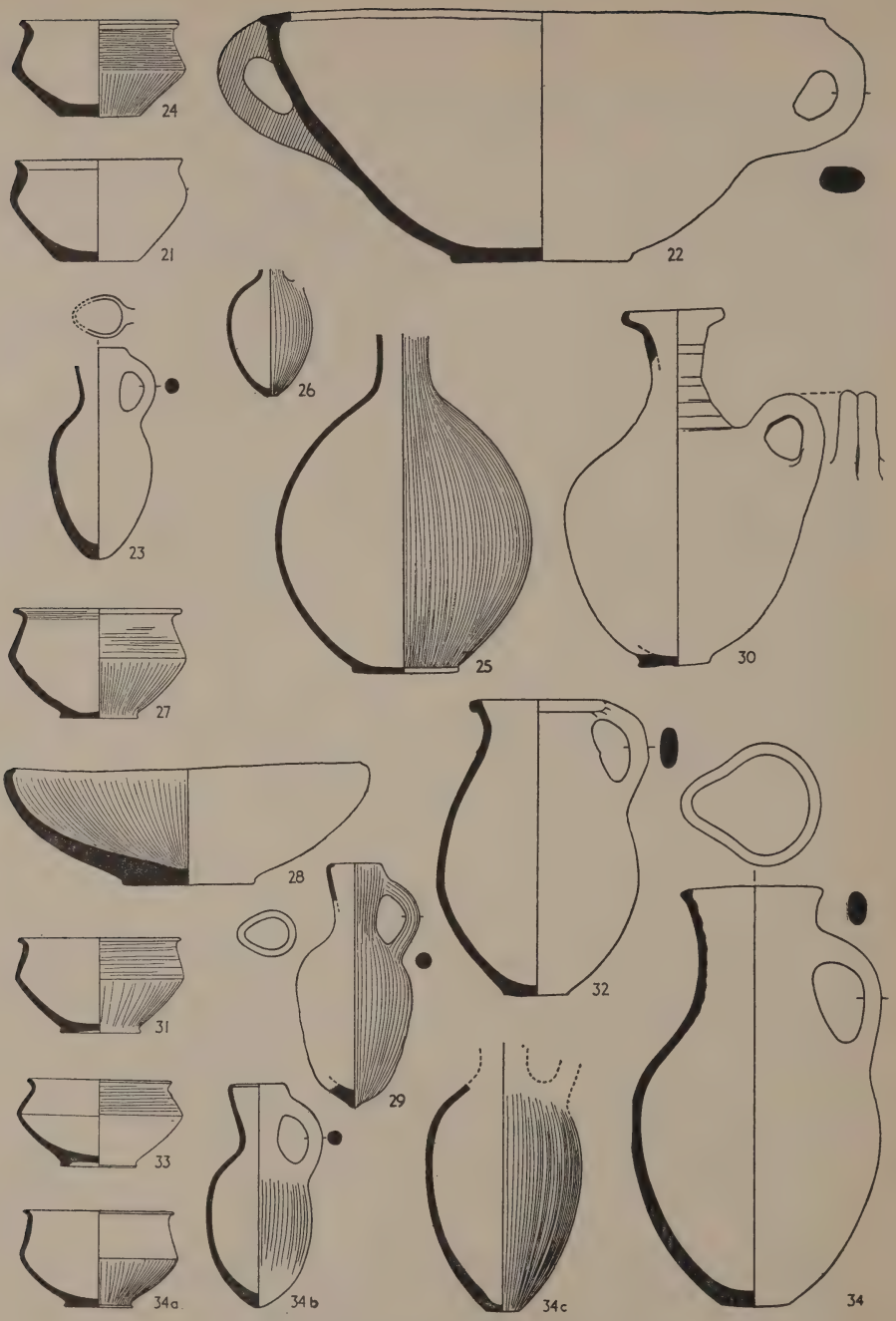


Fig. 11. The Courtyard Cemetery, Tell el-'Ajjul:
Group 3, Nos. 21-34 (1/5)

Fig. 11

GROUP 3

TOMB 1411

21 BOWL Carinated, rounded A.2.*d* *AG* II, 25 E^4 1153
(London, Institute of Archaeology E.XII 7/2)
WARE Brown, some grits. Soft fire. Pronounced wheel-marks below keel.

22 BOWL With handles A.4.*b* *AG* II, 21 M^2 1152
(London, Institute of Archaeology E.XII 3/1)
WARE Buffish-brown, some grits. Soft fire. Warped and broken anciently, two rivet holes in rim.

23 JUGLET Dipper A.6.*f* *AG* II, 51 Y 1151
(London, Institute of Archaeology E.XII 7/3)
WARE Reddish-brown, some grits. Medium fire. Traces thick red slip, surface worn.

TOMB 1412

24 BOWL Carinated, angular A.3.*d* *AG* II, 25 P^5 1155
(London, Institute of Archaeology E.XII 4/1)
WARE Reddish-brown. Hard fire. Thick red slip outside and on rim inside, horizontal hand-burnish above keel, vertical strokes below. Slip without burnish on flat base.

25 BOTTLE Globular A.1.*b* *AG* II, 68 T 1154
(London, Institute of Archaeology E.XII 4/2)
WARE Reddish-brown. Hard fire. Thick red slip, vertical hand-burnish all over. Slip without burnish on disk base. Rim missing.

26 JUGLET Dipper A.7.*a* *AG* II, 51 Y^2 1156
(London, Institute of Archaeology E.XII 4/3)
WARE Buffish-brown. Hard fire. Brown slip, vertical hand burnish. Neck and handle missing.

TOMB 1420

27 BOWL Carinated, angular A.4.*b* *AG* II, 25 G^5 1180
(Oxford, Ashmolean Museum 1932.969)
WARE Brown. Medium fire. Thick red slip outside, and on rim inside, horizontal hand-burnish above keel vertical strokes below, slip without burnish on disk base.

28 BOWL Platter A.5.*b* *CPP* 22 N^2 1178
(Oxford, Ashmolean Museum 1932.1161)
WARE Brown. Medium fire. Traces of slip and radial burnish inside only. Wheel-marks outside near turned disk base.

29 JUGLET Dipper A.8.*g* *AG* I, 51 B^5 1181
(Oxford, Ashmolean Museum 1932.970)
WARE Brown. Medium fire. Some grits visible under dark red slip, vertically hand-burnished.

30 JUG Shoulder-handled A.1.*b* *AG* II, 60 Q^{13} 1179
(Oxford, Ashmolean Museum 1932.1185)
WARE Light brownish-buff. Soft fire. Traces cream slip (?) Surface worn. Twin handle clumsily applied.

TOMB 1418

31 BOWL Carinated, angular A.5.*b* *AG* II, 26 P^5 1173
(Cambridge, Fitzwilliam Museum E. 520.1932)
WARE Brown with large limestone grits. Soft fire. Thick red slip outside and over rim inside. Horizontal hand-burnish on shoulder, vertical below keel.

32 JUG Round mouth A.2.*b* not published 34 $B^{8'}$ 1171
(Cambridge, Fitzwilliam Museum E. 519.1932)
WARE Brown, fired pink in patches. Medium fire. Base turned.

— BOWL Curved *CPP* 21 V 1172
(not kept)

TOMB 1413

33 BOWL Carinated, angular A.6.*c* *AG* II, 25 G[5] 1158
(London, Institute of Archaeology E.XII 2/1)
WARE Buffish-brown. Hard fire. Brown slip outside and on rim inside. Traces horizontal burnish. Slip without burnish on disk base.

34 JUG Pinched mouth A.3.*a* *AG* II, 34 Z[9] 1157
(London, Institute of Archaeology E.XII 2/2)
WARE Buffish-brown. Medium fire. Wet smoothed.

TOMB 1414

34a BOWL Carinated, angular *CPP* 25, P[1] 1159
(Manchester, University Museum 9168)
WARE Brown, some white grits visible. Medium fire. Thick red slip outside and over rim inside. Traces of horizontal hand-burnish above keel, vertical strokes below. Slip and burnish on disk base.

34b JUGLET Dipper *AG* II, 51 B[5] 1160
(Manchester, University Museum 9167)
WARE Brown, many white grits. Medium fire. Thick dark red slip and vertical hand-burnish on body. Pointed base.

34c JUGLET Dipper *AG* II, 35 R[2] 1161
(Manchester, University Museum 9169)
WARE Brown. Medium fire. Thick red slip outside, vertically hand-burnished. Neck and handle missing

TOMB 1415 No finds

Fig. 12. The Courtyard Cemetery, Tell el-'Ajjul:
Group 4. Nos. 35-45 (1/5)

Fig. 12
GROUP 4

TOMB 1407

35 BOWL Carinated, flared A.1 *CPP*, 23 K 17[1] 1122
(London, Institute of Archaeology E.XII 11/1)
WARE Reddish-brown. Soft fire. Red slip outside and over rim inside. Traces horizontal hand-burnish above keel outside, vertical strokes below, surface worn, base missing.

36 JUGLET Piriform, Yehudiyeh type, A.1.*d* *AG* II, 60 M 5[1] 1123
(Not found: drawn from *AG* II)
WARE Dark grey. Traces pricked decoration, comb-applied in zigzags.

— Another, similar 1124

TOMB 1404 (adjoining 1406)

37 JAR Miniature pithos A.1.*a* *AG* II, 55 D[4] 1102
(Jerusalem, Palestine Archaeological Museum, 32.2086)
WARE Grey-brown. Hard fire. Black slip, hand-burnish all over, vertical on body, horizontal above handles, surface worn.

38 JAR Storage A.5.*a* *CPP*, 43 F[4] 1103
(Jerusalem, Palestine Archaeological Museum 32.2087)
WARE Brick red, grey core, with fine black grits. Hard fire. Surface discoloured by firing (red, yellow, brown), much encrusted with lime.

TOMB 1406 (For separate child burial 1406 A, see Fig. 9:6)

39 BOWL Carinated, wide B.1.*e* *CPP*, 23 J[7] 1113
(London, Institute of Archaeology E.XII 6/2)
WARE Brown. Soft fire. Wet smoothed.

40 BOWL Carinated, wide B.2.*e* *CPP*, 25 G[1] 1110
(London, Institute of Archaeology E.XII 6/1)
WARE Brown. Medium fire. Brown slip, horizontally hand-burnished outside and on rim inside.

41 JUGLET Piriform, Yehudiyeh type A.2.*c* *AG* II, 60 M[5] 1114
(London, Institute of Archaeology E.XII 6/5)
WARE Dark grey. Medium fire. Traces pricked decoration, comb-applied in irregular zigzags, surface worn.

42 JUGLET Piriform, elongated C.1.*d* *AG* II, 60 N[5] 1116
(London, Institute of Archaeology E.XII 6/6)
WARE Pinkish-buff. Soft fire. Some white grits.

43 JUGLET Dipper, large, B.1.*h* *CPP*, 51 G[4'] 1112
(London, Institute of Archaeology E. XII 6/3)
WARE Buffish-brown, some grits. Medium fire.

44 JUGLET Dipper, tapering B.2.*h* *AG* II, 51 G[3] 1111
(London, Institute of Archaeology E. XII 6/3a)
WARE Light brown. Soft fire.

45 JUGLET Dipper, tapering B.3.*h* *CPP*, 51 G[8] 1111
(London, Institute of Archaeology E. XII 6/4)
WARE Reddish-brown. Medium fire. Brown slip, smooth burnish.

— JAR STORAGE *AG* II, 38 C[2''] (not kept)

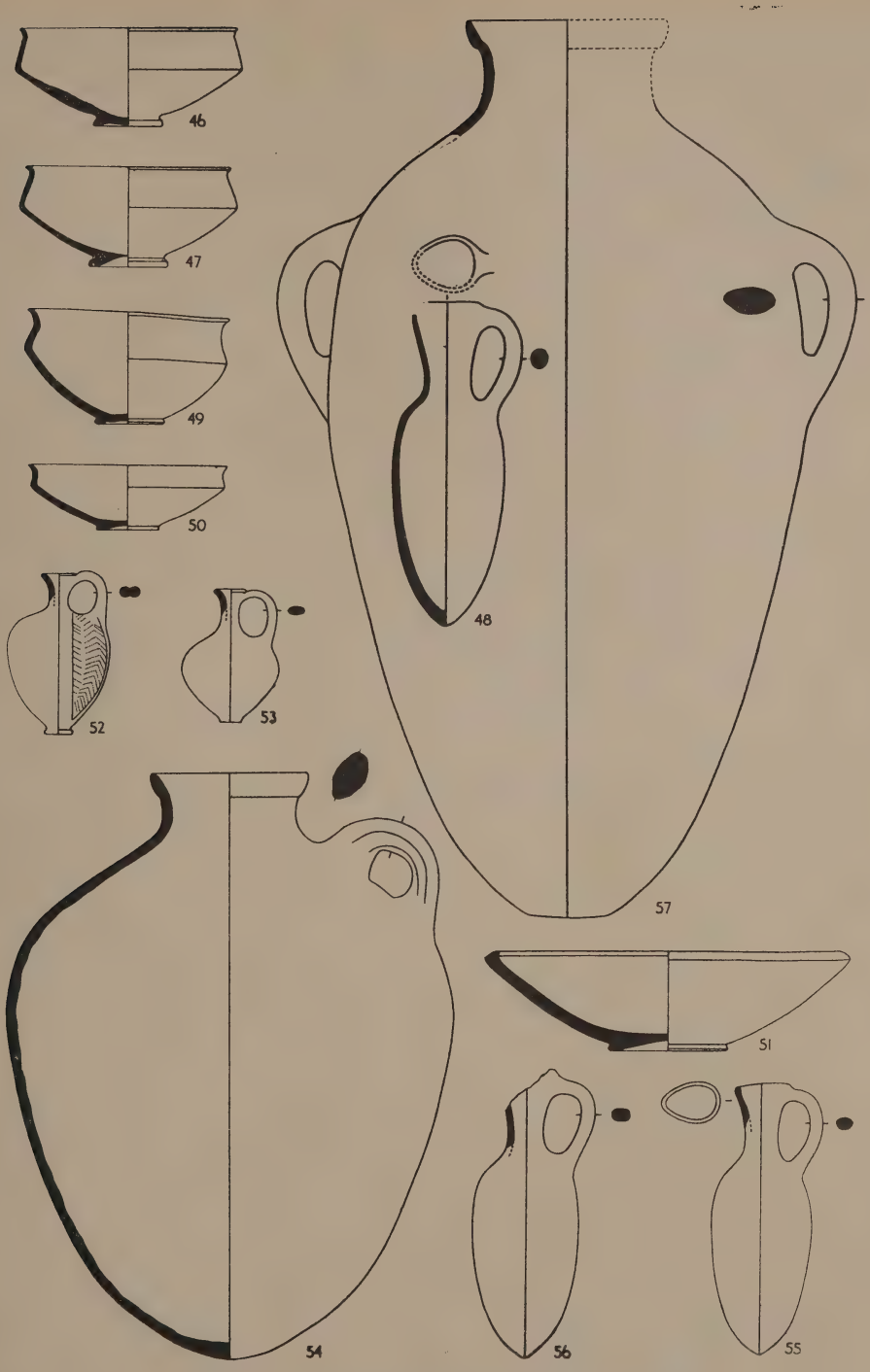
— JAR Shoulder-handled *AG* II, 43 D[6] (not kept)

— METAL Two toggle-pins (Fig. 5) *AG* II, Pl. XVIII: 202 1118
(Not found)

— BEADS (Fig. 6) not published: *AG* II 1119
(London, Institute of Archaeology E. XII 6/7)
WARE Greenish-blue glazed beads, graduated sizes.

— SCARAB—Steatite (Fig. 7) *AG* II, Pl. VII: 103 1120
(London, Institute of Archaeology, E. XII 6/8)

— SCARAB—Steatite (Fig. 7) *AG* II, Pl. VII: 104 1121
(London, Institute of Archaeology, E. XII 6/9)



Group 5, Nos. 46-57 (1/5)
Fig. 13. The Courtyard Cemetery, Tell el-'Ajjul.

Fig. 13
GROUP 5

TOMB 1423

— BOWL Platter (Not found, *cf.* No. 15) *AG* II, 21 M^3 1188

— JUGLET Dipper (Not found, *cf.* Nos. 13, 14 & 23) *AG* II, 51 Y 1190

— JAR STORAGE (Not found, *cf.* No. 57) *AG* II, 43 E^5 1189

TOMB 1424

46 BOWL Carinated, wide, B.3.*c* *AG* II, 25 G^5 1191
(London, Institute of Archaeology E. XII 8/1)
WARE Buffish-brown, some grits. Soft fire. Oblique (semi-) ring base.

47 BOWL Carinated, wide, B.4.*b* *AG* II, 25 G^5 1193
(London, Institute of Archaeology E. XII 8/1)
WARE Reddish-brown, some grits. Soft fire. Buff surface worn. Deep concave disk base.

48 JUGLET Dipper, long rounded B.4.*f* *AG* II, 51 G^3 1195
(London, Institute of Archaeology E. XII 8/2)
WARE Yellowish-brown. Soft fire. Surface worn and lime encrusted.

— JUGLET Piriform *CPP*, 60 M^4 1192
cf. No. 53

— JAR Storage *AG* II, 43 E^5 1194
cf. No. 57

TOMB 1410 A

49 BOWL Carinated, wide, B.5.*c* *CPP*, 25 G^1 1138
(Jerusalem, Palestine Archaeological Museum 32.2094)
WARE Pinkish-buff, sandy with fine black grits. Hard fire. Light buff slip.

50 BOWL Carinated, wide, B.6.*b* *AG* II, 25 S 1136
(Jerusalem, Palestine Archaeological Museum 32.2092)
WARE Pinkish-buff, sandy with fine black grits. Hard fire. Discoloured grey surface outside below keel. Self-slip.

51 BOWL Platter A.6.*b* *AG* II, 21 M^3 1133
(Jerusalem, Palestine Archaeological Museum 32.2089)
WARE Buff, very fine grits. Medium fire. Self-slip, fired pinkish in parts on outside.

52 JUGLET Piriform, Yehudiyeh type, A.3. *AG* II, 60M^6 (late 60 M^5) 1132
(Jerusalem, Palestine Archaeological Museum 32.2088)
WARE Grey. Hard fire. White colouring in some of comb-applied pricked decoration, zigzags divided into 3 zones by plain panels. Surface worn and rough.

53 JUGLET Piriform, B.1.*b* not published 60 M^4 1134
(Jerusalem, Palestine Archaeological Museum 32.2090)
WARE Light brown, many fine grits. Medium fire. Self-slip (?). Surface badly worn.

54 JAR Shoulder-handled, A.1.*f* not published 38 B^2 1135
(Jerusalem, Palestine Archaeological Museum 32.2091)
WARE Pink. Hard fire. Self-slip, discoloured pink and buff by firing.

55 JUGLET Dipper, long rounded. B.5.*h* *AG* II, 51 G^3 1141
(Jerusalem, Palestine Archaeological Museum 32.2097)
WARE Light pinkish-brown with fine grits. Softish fire. Pinkish-brown slip, smoothed.

56 JUGLET Dipper, long rounded. B.5.*h* *AG* II, 51 G^3 1140
(Jerusalem, Palestine Archaeological Museum 32.2096)
WARE Light brown with fine grits. Medium fire. Pinkish-buff slip, much worn.

57 JAR Storage, long ovoid, A.6.*a* *AG* II, 43 E^5 1137
(Jerusalem, Palestine Archaeological Museum 32.2093)
WARE Buff, grey at core. Fine black grits. Hard fire. Buff slip, discoloured pink, smoothed surface.

58 JAR Storage, ovoid A.7.*a* *AG* II, 43 E^4 1135
(Jerusalem, Palestine Archaeological Museum 32.2095)
WARE Grey-brown, fired pink inside and out. Very fine black grits. Hard fire. Pinkish slip.

— JUGLET Piriform *AG* II, 60 N (not kept) 1142

TOMB 1410 B

— METAL Toggle-pins (Fig. 5) *AG* II, Pl. XVIII: 204-5 1143-4
(Jerusalem, Palestine Archaeological Museum 32.2098-9)

— SCARAB Steatite (Fig. 7) *AG* II, Pl. VII: 106 1145
(Jerusalem, Palestine Archaeological Museum 32.2100)

BEADS around neck, not found

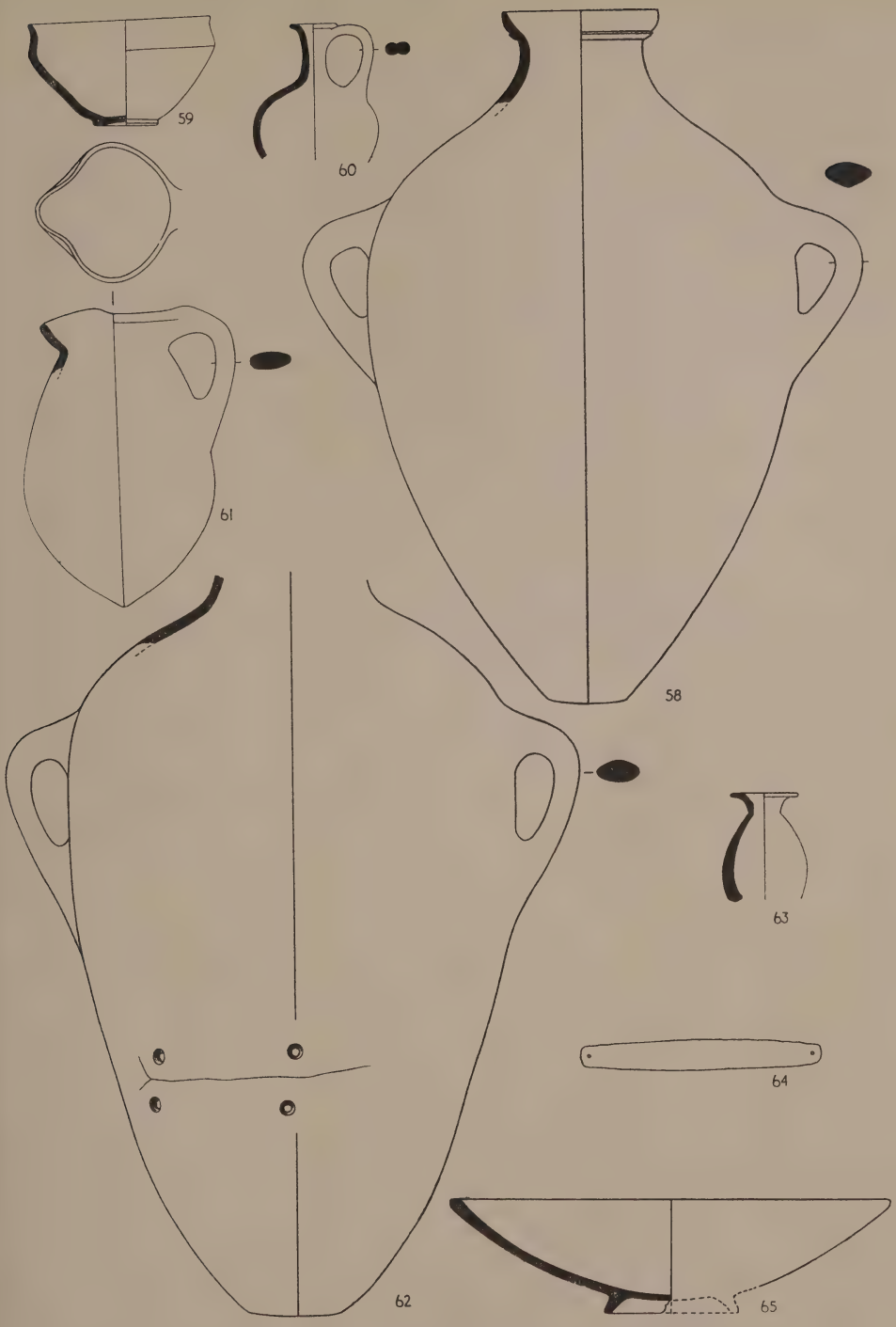


Fig. 14. The Courtyard Cemetery, Tell el-'Ajjul.
Group 5, No. 58; Group 6, Nos. 59-65 (1/5)

Fig. 14
GROUP 6

TOMB 1410 C

59 BOWL Carinated, wide, B.7.*b* — *CPP*, 26 C^2 — 1148
(Jerusalem, Palestine Archaeological Museum 32.2103)
WARE Light greenish-buff, fine black grits. Medium fire. Buff slip, pinkish in patches. Badly worn surface.

60 JUGLET Piriform, wide ovoid B.2 — *CPP*, 60 M^5 — 1149
(Jerusalem, Palestine Archaeological Museum 32.2104)
WARE Light brown, fine grits. Soft fire. Traces of pinkish slip, originally burnished (?), but surface worn and coated with lime. Base missing.

61 JUG Pear-shaped, A.4.*f* — *AG* II, 34 B^9 — 1147
(Jerusalem, Palestine Archaeological Museum 32.2102)
WARE Brick red, fine grits. Medium fire. Self-slip.

62 JAR Storage, ovoid A.8.*a* — *AG* II, 43 E^5 — 1146
(Jerusalem, Palestine Archaeological Museum 32.2101)
WARE Pinkish-red. Hard fire. Pink slip, smoothed. Vertical tool marks on lower part. Four rivet holes.

— SCARAB Steatite (Fig. 7) — *AG* II, Pl. VII: 105 — 1150
(Jerusalem, Palestine Archaeological Museum 32.2105)

TOMB 1416

63 VASE Calcite (see p. 20) — *AG* II, Pl. XXII: 7 — 1162
(Cambridge, Fitzwilliam Museum E. 517.1932)

64 METAL GOLD FRONTLET (see p. 20) — *AG* II, Pl. III: 42 — 1164
(Cambridge, Fitzwilliam Museum E. 501.1932)

— METAL Gold toggle-pin (Fig. 8) — *AG* II, Pl. III: 14 — 1163
(Cambridge, Fitzwilliam Museum E.502.1932)

— METAL Two toggle-pins on shoulder — 1163 A, B
(not found)

65 BOWL Platter A.7.*c* — *AG* II, 21 D — 1165
(Cambridge, Fitzwilliam Museum E.522.1932)

1 *Annual of the American School of Oriental Research* (New Haven, 1920-) vol. XII (1932), vol. XIII (1933) Strata H-I.
2 Tufnell, *Lachish* IV (1958), 41 ff.
3 Kenyon, *Jericho Tombs* I (1960), 180 ff.
4 Glueck in *AASOR* XVIII-XIX; XXV-XXVIII.
5 *American Journal of Semitic Languages and Literatures* (Chicago 1897-), vol. LV, No. 4 (Oct. 1938) 337-359
6 Petrie, *Ancient Gaza* II (1932), 13.
7 *AJSLL* LV, 4, 350.
8 *AG* II, 5.
9 *op. cit.*, par 44 and Pl. XLV.
10 *AG* III (1933), Pl. XLVI.
11 *AG* II, 13.
12 There is no precise evidence for dismemberment of the dead in MB Palestine, though there are traces of this custom in the Iron Age and later. Petrie thought it was practised at Hu in Egypt, but Brunton writing of a contemporary and similar Pan Grave culture at Mostagedda could find no evidence *Diospolis Parva*, (1901) 39, 45; *Mostagedda* (1937), 123.
13 Schaeffer, *Ugaritica* II (1949), 54, Fig. 20.
14 *AG* III, par. 28 and Pl. XLIX.
15 *JT* I. 264. 370, 393.
16 Petrie, *Bethpelet* I, (1930), Pl. XLV.
17 *AG* I (1931), Pls. X and LVII.
18 *Lachish* IV, 172.
19 *QDAP* VI 107, No. 2b.
20 *AASOR* XIII, 73.
21 Loud, *Megiddo* II *OIP* LXII (Chicago 1948), e.g. Pl. 15:1, T.5177
22 *QDAP* V, 122 No. 22; 123 Nos. 23-4; 124 No. 59; *QDAP* VI, 116 Nos. 73-5.
23 Yadin, *Hazor* I (Jerusalem, 1958), 110-112, Pl. C: 2, 19.
24 Yadin, *Hazor* II (Jerusalem, 1960), 165.
25 *JT* I (1960), 354, Bowl D.4.c.
26 *op. cit.* 274, Bowl C Carinated, wide.
27 *op. cit.* 352 ff.
28 *op. cit.* 355.
29 City Level III at 'Ajjul is Petrie's 'XIIth dynasty city', on the south end of the tell; for the register of pottery, see *AG* I, Pl. LXII; type 6 C^3 is illustrated in Duncan's *Corpus of Palestinian Pottery* (London 1930) Palace I is on the north end at 968-923 a.s.l.; for the register of pottery see *AG* II, Pl. LV; type 6 C and 6 N 4-5 are also in Duncan's *CPP*.
30 *JT* I, 272, Bowl A, Platter 3 c, Fig, 135:1.
31 *QDAP* VI (1938), 169-209. The 'Toggle-pins' in the Palestine Archaeological Museum.
32 *AG* IV (1934), 11 and Pl. XXXIV:522.
33 'Daggers and Swords in Western Asia' *Iraq* VIII (1946), 1-16.
34 *Ugaritica* II, 107 ff.
35 *Megiddo* II, Pl. 173:1, T.4052; Guy and Engberg, 'Megiddo Tombs', *OIP* XXXIII (Chicago 1938), 160-164, Fig. 170.
36 For later occurrences, see Petrie, *Bethpelet* I, Tombs 565, 551, 569, 556, 559, 564, 550 arranged in approximate chronological order; see also *BP* II, Tomb 1021.
37 *ABSAA* XXVIII (1926-7), 243-296.
38 *ABSAA* (1953-4), 220 and note 9; 260 Pl. XVIII:35 and *BP* II, Pl. XC T.1002; Pl. XLII 22. T.1021.
39 *AAA* XX, Pl. XXV, Tomb 5.
40 *JT* I, 355.
41 Dr. Kenyon is now prepared to agree that this contact is admissible, *JT* I, 301

The Portal Dolman of Dromanone - Co. Roscommon

by C. Topp

Location

The monument (Pl. 1) which is the subject of the present paper is situated in the Townland of Dromanone, parish and barony of Boyle, Co. Roscommon (O.S. 6 in., sheet 5, 24 cm. from E, 21.8 cm. from S). It lies 200 yards north of the Boyle River's emergence from Lough Gara. Although slightly below the 300 ft. contour it occupies a dominating position in the countryside. Geologically the area is one of Lower Carboniferous Sandstone which is almost everywhere drift-covered.[1]

The dolmen itself is built of millstone grits whose massive coarse quartzose sandstone contains much mica. These blocks may well have been brought from the Curlew Hills though there is always the possibility of the presence of erratics on the site.

Former References

The dolmen is mentioned in Borlase[2] who reproduces a sketch taken from Wilkinson's *Ancient Architecture of Ireland* and quotes Grose's description of it in the *Irish Penny Magazine* of September 7th 1833. It was also described and measured by the Rev. F. E. Clarke[3] who specifically states that the capstone does not rest on 'the eastern transverse' (i.e. the portal stone No. 5 on plan, Fig. 1). He also quotes Weld's story of the eighteenth century miller who removed one of the uprights and thus caused the present marked slope of the capstone.[4]

The Monument before excavation (Pl. 1, *a*)

The chamber (plan, Fig. 1) consists of a capstone 4.3 (east-west) by 3.6 m.,

[1] Geological Survey: *Explanatory Memoir to accompany Sheets 66 and 67: Sligo, Leitrim, Roscommon and Mayo* (1878).
[2] W. C. Borlase, *The Dolmens of Ireland* (1897), I, 195-7.
[3] Rev. F. E. Clarke, 'Notes on the Tinnecarra Cromlech near Boyle', *P.R.I.A.* 3rd sec., V. No. 3, (1899) 374-6.
[4] Weld, *Survey of Co. Roscommon*, (1832), 278-9.

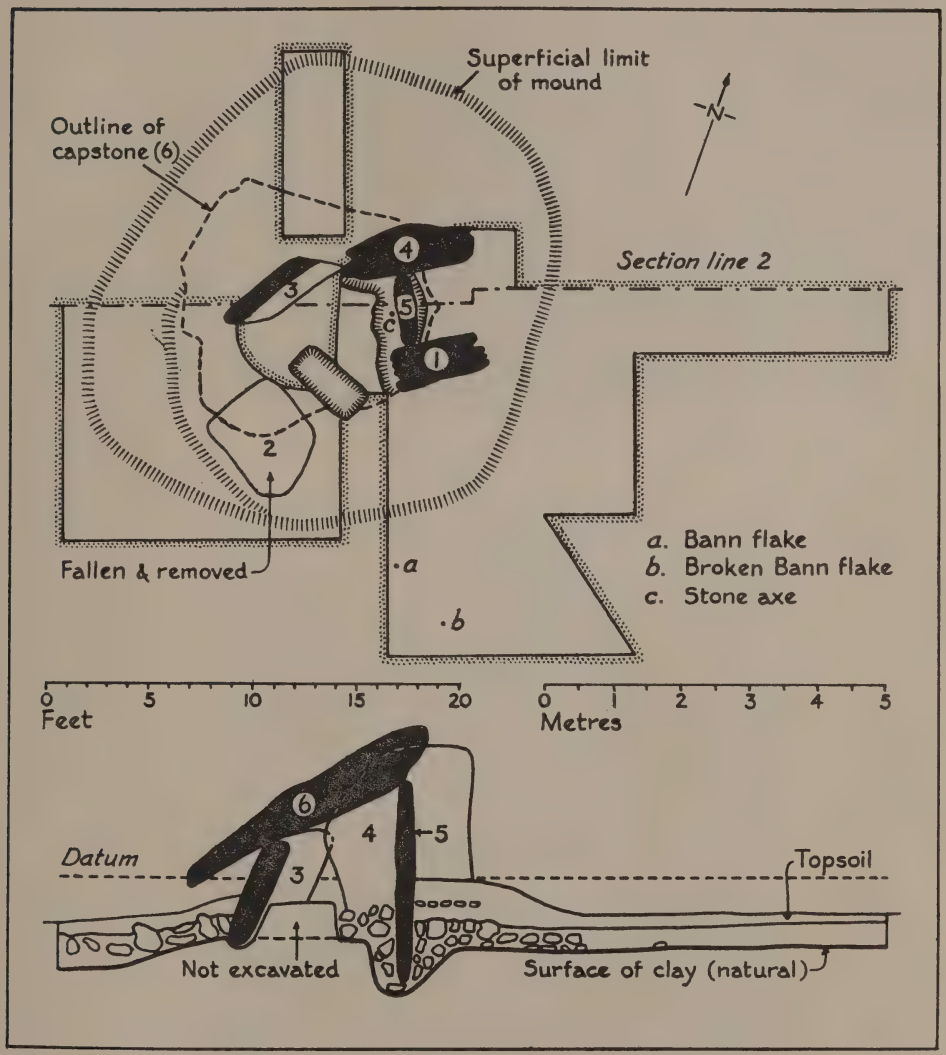


Fig. 1. Dromanone burial chamber: plan and section

with a maximum thickness of 0.7 m. It rests at present on the two northern orthostats and on the portal stone. It has obviously slipped sideways and backwards and is now tilted at a dangerous angle towards the west side where it is only 0.7 m. above ground as compared with 3.0 m. on the east. It is supported mainly by the very shallow orthostat (3) and by the portal stone (5); it rests on the latter (which is badly cracked) by reason of a bulge on its undersurface. The portal stone itself is a parallel-sided slab with an oblique top and a pointed base. It is 2.95 m. long overall, 1.1 m. wide and 0.2 m. thick.

Of the remaining orthostats, that on the south side (1) is extremely weathered, 3.55 m. in overall length, 1.8 m. in breadth and 0.6 m. in thickness. Its twin upright (4) on the north side is 3.15 m. long, 1.8 m. broad, with an average thickness of 0.7 m. Stone 3 (which slopes forward and leans against Stone 4) is only 1.75 m. in overall length. It is 1.25 m. broad and has an average thickness of 0.35 m. Its depth below the datum line (i.e. 0.7 m. above the field surface) is only 0.30 m. whereas the respective similar depths of stones 5, 1 and 4 are 1.50 m., 1.70 m. and 1.45 m. from datum to base.

Finally, a prostrate stone (Pl. 1 and No. 2 in the plan) was removed from the southern side of the dolmen. It is evidently one of the missing uprights of which there might originally have been six and is 1.6 m. long, 1.1 m. broad at its greatest breadth and 0.35 m. thick; it was later replaced upright in the excavated portion of its socket.

It was impossible to calculate the original dimensions of the burial chamber (whose long axis runs almost due east-west) owing to the slip of stones 3 and 6, and especially because we were only able to excavate one half of its present area.

The monument before excavation was surrounded on all sides by a very low mound of stone rubble mixed with earth (Pl. 1). This was highest on the north and east sides where it measured 0.7 m. above the surface of the field-level and lowest on the south side where it fell away to 0.3 m.; on the west side it rose again to 0.5 m. (see Section).

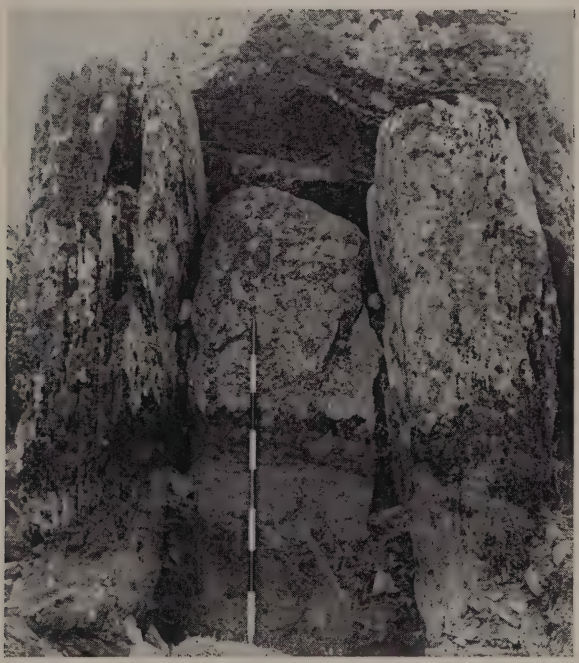
Excavation

Various trial pits dug around the dolmen all showed the same soil sequence: 1. topsoil to a depth of 7 ins. below ground surface; 2. light brown stony subsoil to a depth of a further 8 ins.; 3. dark yellow clay which was the natural subsoil. In places on the south side yellow clay overlay layer 2.

The site was excavated in quadrants, but because of risks to the stones and to stone 3 in particular the two northern quadrants were not in the end removed. The north side of the mound was examined only in a single cutting. Trench 4, originally 3 m. long, was extended a further 3 m. in a vain attempt to establish evidence of a former covering mound.

PLATE 1

a



b

Dromanone burial chamber: *a*. before excavation;
b. the portal, as excavated.

The Chamber

The eastern half of the chamber was cleared down to the natural clay of the sockets and their packing stones examined wherever possible. At 0.50 m. below datum burnt stones, a few charcoal fragments and bones, some burnt, some unburnt, occurred haphazardly in a black sticky soil, all greatly disturbed. There was an extensive cremation scatter throughout, with a pocket of finely comminuted bones between large stones in the south-eastern quarter near the base of Stone 1 and a second pocket of very black burnt bone at the opposite end of the base of Stone 1 at 0.95 m. below datum. Odd finds included a fragment of cranium, a minute piece of translucent flint, one of rose quartz and one of glass.

Clay was met with at 0.90 m. below datum in the centre of the eastern part of the chamber. To the east of this there was brown earth with stones and some burnt bone fragments which went to a depth of over a metre against Stone 5, the base of which appeared to rest on two largish flat stones which were not removed. Here at a depth of 1.0 m. almost against the face of Stone 5 was found a polished stone axe (Fig. 2). There were packing-stones to a depth of 1.35 m. at the base of Stone 4 and against this and the bottom of Stone 1 were other smaller bands of clay of lighter texture and of a darker grey colour than that at the centre. There were many large stones within the chamber at various depths but no trace of proper paving: the whole area was obviously much disturbed.

The western half of the chamber could only be excavated on its southern side because of risks to the structure, even with Stone 3 propped in place. A large fragment removed from the surface may have come from the capstone or have been part of the prostrate Stone 2. Part of the socket for this stone was located: it was 1.30 m. below datum and had been greatly disturbed. In it were found, mixed haphazardly, burnt and unburnt bone fragments (including a tooth and a portion of jaw bone), glass, a fragment of iron and modern china.

The Portal

Clearance of the portal area revealed much recent disturbance with many modern finds as well as blackened stones and charcoal fragments. Some large slab-stones occurred both immediately beneath the topsoil and, during the removal of the portal-filling, at 0.80 m. below datum. Further flagstones were found set on a curve in the natural clay underlying the stones of the filling and the socket of Stone 5, cut into this clay, contained wedging stones in a matrix of a darker and more sandy clay. Nothing of archaeological interest was found in this area.

The area surrounding the chamber

A spread of large stones surrounded the dolmen on all sides. Whether or not this was the base of a structure built to assist in the setting up of the chamber it might be regarded as the much reduced remains of a covering mound.

On the north the stones extended 3.10 m. from the chamber; elsewhere the spread was much less. They were sunk in a layer of clay which in places overlay the light brown stony layer. This was noticeable especially on the south side in quadrant 1 where a layer of clay two to three inches thick covered the normal stony layer. This had the aspect of a prepared clay floor which, however, did not exist on the portal side of the dolmen.

A noteworthy feature revealed by excavation was the difference in depth between stones 1, 4 and 5 and stones 3 and 2. In particular the unexpected depth of the portal stone 5 showed that it was not a mere closing stone but a constructional complement to stones 1 and 4.

Finds

The stone axe. The only important find within the chamber was a small axehead of polished stone (Fig. 1, *c*). Its dimensions are : overall length 8.7 cm.;

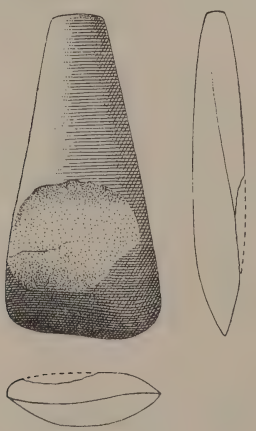


Fig. 2. Dromanone burial chamber: the stone axe ($\frac{1}{2}$)

breadth at cutting edge 4.2 cm.; at butt 1.35 cm.; in middle 3.4 cm.; greatest thickness 1.4 cm.; thickness of butt 0.6 cm.

The section is pointed-oval; the somewhat irregular butt is square and flat with slight facetting on the sides. There are faint marks of use on the S-curved cutting edge, which is sharp and well ground, and the general surface is very

well polished. A large flake has been removed from one face. Some ferruginous concretions may well be due to the surrounding soil.

The axe was petrologically analysed by the S.W. Implement Petrology Committee through the kind offices of Dr. J. F. S. Stone, F.S.A., and found to belong to Group IX of the Implement Petrology Survey (porcellanite from the screes of Tievebulliagh Hill in County Antrim).[5]

The Dromanone specimen is the most westerly one so far identified as a product of this important axe-factory whose distributional range over the British Isles has been mapped by Jope.[6] No specimen has yet been found in a datable context and unfortunately the Dromanone one is no exception to this.

Professor Childe suggested that this implement might better be called a gouge than an axe because of the S-curved cutting-edge. It must however be said that while unmistakeable gouges exist, there are also many axes of what Sir John Evans calls 'this bastard kind'[7] in Ireland (e.g. from Lough Neagh). He describes them as 'celt-like implements not actually ground hollow but having one face much flatter transversely than the other'. He further adds that a few of these Irish implements are actually hollowed at the edge in order to make them more truly gouge-like and that they would be useful for hollowing out canoes. His Fig. 115 approximates most closely to the Dromanone specimen.

Other finds from the chamber. Apart from the scraps of flint already referred to, the only finds from the chamber were modern potsherds and glass (at all levels) and considerable quantities of burnt bones, which were widely scattered and included nine pieces of cranium. There was no prehistoric pottery.

In the socket of stone 2 were found two unburnt large fragments of animal long bones of recent origin, and more of the cremation including a small tooth and a fragment of its slender parent jawbone and other portions of cranium. The fact that one of these has open sutures, taken together with the size of the tooth and jawbone fragment, suggests the presence of a youngish individual. Three pieces of chert included a small core. Other finds were modern.

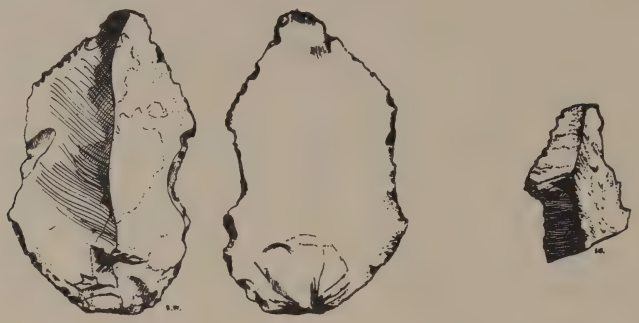
Finds from outside the chamber. The main finds here were the two Bann flakes. Both were found in the light stony layer on the S.W. side at a depth of 6 ins. below the surface as shown on the plan, Fig 1, *a*. The first, of flint, with heavy white patination patched with yellow, is typical (Fig. 3, *a*), 8 cm. long by 4 cm. in

[5] J. F. S. Stone and F. S. Wallis, 'Third report of the sub-committee of the South-Western Group of Museums and Art Galleries on the Petrological Identification of Stone Axes'. *P.P.S., 17* (1951), 99-158.

[6] E. M. Jope, 'Porcellanite Axes from Factories in North-eastern Ireland: Tievebulliagh and Rathlin', *U.J.A.* 3rd ser., *15* (1952), 31-60.

[7] Sir J. Evans, *The Ancient Stone Implements, Weapons and Ornaments of Great Britain.* (2nd ed., 1897), 178-82.

maximum width. It has a slightly waisted outline; the tip is broken and the edges display secondary working as well as signs of much use.



a *b*

Fig. 3. Dromanone burial chamber: Bann flakes (½)

The second Bann flake (Fig. 3, *b*) is of black banded chert. It is a fragment only 4 cm. long, its tip and about half of its lower portion being missing. There are traces of secondary retouch along one edge and marks of use.

Other finds included a small black chert core-scraper 3 cm. long of carinated type. It shows slight secondary working around the edges and on the keeled surface and also marks of use.

The Dromanone dolmen belongs to the group of Irish portal dolmens which has been much discussed in recent literature.[8] The type constitutes Daniel's Class E of Irish megalithic tombs of the Gallery Grave series. Their outstanding feature is a pair of matching jambs with a 'septal' slab between them, the latter not supporting the capstone.

The feature of outstanding interest at Dromanone is that the portal or septal stone (5) did not function as a movable closing feature, allowing for the insertion of successive burials. Its depth below the surface is similar to that of the two jamb-stones; but its top falls short of the underside of the capstone and though not movable it clearly had no supporting part to play in the structure of the chamber. (Pl. 1, *b*).

As to the finds, the Bann flakes suggest a link with the neighbouring crannogs of Lough Gara, where they abound; but they are of little help in precisely dating the tomb since their use covers a very extensive period of time in Ireland. The

[8] e.g. L. Mongey, 'The Portal Dolmens of South-Eastern Ireland', *Journ. Waterford Spel. Soc.*, *1*, (1941), 4.

Tievebulliagh implement, whether axe or gouge, is clear evidence of long-distance trade. Jope says: 'of the petrologically identified areas of this rock with recorded contexts all but one are neolithic'. The evidence, such as it is, suggests that the Dromanone dolmen must be regarded as late in the Neolithic period. The burial rite appears to have been uniformly cremation, but no conclusions are possible as to the number of individuals represented. The problem of the method of inserting burials in the chamber is unsolved. Since the portal was not used it is possible that in some way the opposite west end, at present open, was brought into operation. But much has yet to be learned of these tombs and it may be that all the remains were deposited at one time in a monument built to receive them and not subsequently disturbed until recent times.

APPENDIX A: STONE GOUGE: PETROLOGICAL REPORT

by J. F. S. Stone and F. S. Wallis
(South Western Group of Museums and Art Galleries Stone Axe Sub-committee)

Macroscopic: A fine-grained, bluish-black, igneous rock.
Microscopic: Usual characters of Group IX.
Group IX (Tievebulliagh Hill).

APPENDIX B: SKELETAL MATERIAL

by E. Keenan
(Anatomy Department, University College, Dublin)

I. *CREMATION*

1. *East half of chamber*
   (a) Cremated human remains, fragments of skull, limbs and trunk bones. Owing to the remains being cremated, and so much fragmented, it is not possible to determine age, sex or stature. A few fragments of non-cremated animal bones are also present.
   (b) Fragmented remains of adult male, incompletely cremated. Fragments of skull, limbs and trunk are recognisable. Owing to the state of the fragments it is not possible to give further details. There are some animal bones present.
   (c) Five fragments of cremated cranial bones.
   (d) A fragment of cremated neck and head of human femur, metatarsal, two of vertebrae, and a few unidentifiable fragments.

2. *West half of chamber*
   A number of fragments of cremated adult skull and limb bones. Owing to the state of the fragments it is not possible to give further details. A few fragments of non-cremated animal bones are present.
3. *Socket of Stone 2*
   A few fragments of cremated human skull and limb bones and one tooth.
4. *Pocket of S.W. corner of east half of chamber.*
   A few fragments of cremated human skull and limb bones.

APPENDIX C: UNBURNT ANIMAL BONES FROM SOCKET OF STONE 2

by G. Roche
(Natural History Division, National Museum of Ireland)

3 fragments of right metatarsal of Ox.
1 fragment of probably left metatarsal of Ox.
2 fragments possibly a femur of a Sheep.

APPENDIX D: CHARCOAL

by M. J. P. Scannell
(Natural History Division, National Museum of Ireland)

1. *W. half of chamber*
   Corylus (hazel) 3 pieces.
   Fraxinus (ash) 1 piece.
2. *E. half of chamber*
   Quercus (oak) 4 pieces.
   Corylus (hazel) 4 pieces.
   Ilex (holly) 1 piece.
   Pyrus (pear) 1 piece.
3. *From north trench*: Quercus (oak) 4 pieces.
4. *Socket of Stone 2*: The two pieces of charcoal in the box thus labelled are very small. They appear to be the charcoal of roots, but of which tree I cannot say.

Acknowledgements

The funds for the excavation were provided by the Special Employment Scheme's Office on the recommendation of the Royal Irish Academy. It was carried out in conjunction with the investigation by the National Museum of the Cranmogs at Lough Gara under the direction of Dr. J. Raftery to whom I am vastly indebted in countless ways.

I am also grateful to Mr. P. Cauley, the landowner, for permission to excavate.

I must thank Professor Keenan, Miss Roche and Miss Scannell for the specialist reports which are printed as appendices. I have already recorded my gratitude to the late Dr. J. F. S. Stone, in connexion with the Tievebulliagh implement.

Mr. N. Bayne, Miss E. M. Waldron, Mr. H. M. Stewart and Mr. M. B. Cookson have helped me in the preparation of illustrations and my husband and son were responsible for the surveying and photography of the site.

Finally I am most grateful to Professor Bersu, Mr. A. T. Lucas of the National Museum and other distinguished visitors who contributed valuable suggestions; to Mr. P. J. Hartnett of Bórd Fáilte Eireann, Miss E. Prendergast of the National Museum and Mr. L. Mongey for maps and literature; and above all to the late Professor V. Gordon Childe for much help and advice.

The Ground Beneath our Feet

Temporary Sections at 31-4 Gordon Square, London, W.C.1.

By I. W. Cornwall

In the spring and summer of 1955, demolition of the four Georgian houses, Nos. 31-34, occupying the north side of Gordon Square, made way for the excavators preparing the site for the foundations of the new block to house the Institutes of Archaeology and Classical Studies and the University Examination Halls.

The basements of the old houses, some 6-7 feet below present pavement-level, had already involved removal of a now unknown depth of soil between the level of their floors and the ground-surface existing at the time of their building. Thus, any evidence of pre-Georgian occupation of the site in historic times had already been destroyed.

Four trial holes were sunk into the subsoil to explore the nature and depth of the underlying deposits, before the further excavations, necessary to lay the foundations of the present building. These proved the existence of up to 9 feet of sand and gravel, overlying blue clay, capped by a remainder of some 2 feet of undisturbed natural flood-loam, of which the upper layers had probably been removed in excavating the former basements.

The positions of these trial holes and the sections exposed in them were recorded by the contractors and I am indebted to Mr. Pinckheard, of Messrs. Booth & Ledeboer, the architects, for a copy of this drawing.

Excavation then proceeded to the greater depths required by the present basement storage-space and, in particular, the boiler-room and lift-wells, which mark the deepest penetrations made into the subsoil. At this stage, Mr. E. Pyddoke, the Secretary, and I visited the site on several occasions, to record the temporarily-exposed deposits and in the hope of finding some fossil or archaeological remains which could later be exhibited as coming from the very ground beneath the new Institute. In this latter ambition we were unsuccessful. A few small undeterminable fragments of bone, in the last stages of decay, were the only fossils and diligent search of the exposed faces of gravel and heaps of excavated material yielded nothing in the nature of flint artifacts.

The opportunity was taken to examine the sections in the trial holes. Owing to the incoherent nature of the gravel, the sides of these had had to be partly shored up with timbers and cross-struts, so that no complete view of a vertical face was to be had, and, in one case (T.H.3), the hole had filled to some depth with water.

The zero-datum for our measurements was the threshold-sill of the second (from the E.) coal-hole under the pavement on the S. boundary of the site, about 30 ft. from the S.E. corner. The absolute level of this was 75 ft. O.D., 7 ft. below street-level.

Trial Hole No. 1 (N.W.) showed a disturbed section to a depth of 8 ft. 6 ins. below datum and a modern brick was seen in the section just above this point. The disturbed material was a dirty brown loam, full of rubbish and easily distinguished from the river deposits *in situ*. Clean, pale sandy gravel 3 ft. 6 ins. in depth was visible in the lowest part of the hole, with an irregular, more ferruginous, band towards its summit. The hole, as excavated by the contractors, did not reach the clay, but this was proved at −12 ft. 6 ins. (62.5 ft. O.D.) by taking out another 6 ins. of gravel (redder and loamier than above) with a hand-trowel. Water stood close to the surface of the clay.

Trial Hole No. 2 (N.E.). This was not seen by us, having been already filled in and covered with a ramp of excavated material built to admit contractors'

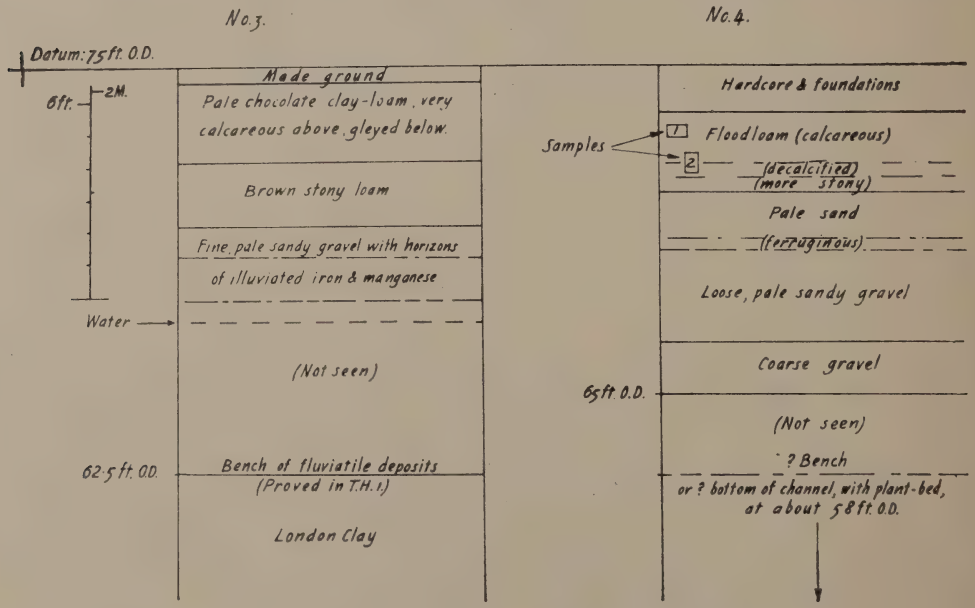


Figure 1. Nos. 31-4 Gordon Square, W.C.1: Sections in Trial-holes Nos. 3 and 4.

lorries to the floor of the site at its N.E. corner. From the drawing, it showed 'sand and gravel' from −12 ft. (62 ft. O.D.) to −5 ft. 6 ins. and 'sandy brown clay' (?floodloam) from this surface up to 11 ins. below datum.

Trial Hole No. 3 (Fig. 1, left) gave the section shown. This reached, and penetrated to a depth of 2 ft. into, the clay. When seen, the hole contained 4 ft. 5 ins. of water, so that the junction of the gravel and clay could not be proved, but it was (no doubt accurately) shown at −12 ft. 6 ins. (62.5 ft. O.D.) on the contractor's drawing. The depth of water was measured at the time and corresponds with this figure.

Trial Hole No. 4 (Fig. 1, right). This was situated about 60 ft. E. from the Gordon Street boundary. Though reaching a depth of only −10 ft. 2 ins. in the gravel and not exposing the clay, it gave the most detailed section of the four. Two samples taken from the loam in this section are discussed below.

With minor variations, these sections seem to correspond to a single normal cycle of river-aggradation—gravel, sand, loam—reaching a proved height of 74 ft. 7 ins. O.D. in T.H.3; about 1 ft. less in T.H.4. How much more we should allow for the height of the old surface before building cannot now be ascertained. The gardens of the houses to the north of the site lie 6-7 ft. below street-level and this brings their surface-level close to our 75 ft. datum. The garden in the middle of Gordon Square, on the other hand, is at street-level. Whether the former are excavated or the latter made up could be decided only by further trial-holes, but in view of the deep disturbance to 8 ft. 6 ins. below datum noted in T.H.1, adjacent to the house-gardens and the backs of the Gordon Street houses, the former seems to be the more likely explanation and is in accordance with practice at the time when the houses were built.

With a minimum height for the river deposits of *c.* 75 ft. O.D., we are left with the impression, therefore, that the original natural surface may have been some 6 ft. or so higher. A bench-level for the river deposits of 62 ft., more or less, corresponds well with those previously observed, if not recorded as such, by Hicks.[1]

This paper describes and illustrates a number of sections exposed by sewer-trenches in Endsleigh Street, Endsleigh Gardens, Gordon Street, Gordon Square and Tavistock Square, in which occurred locally a plant-bed, lying in depressions in the London Clay below the main river-gravel. The plant-association indicated a pond or marsh environment and at one point remains of a young mammoth were found at this horizon. Hicks regarded the deposits overlying the London

[1] Hicks, H., "On the discovery of Mammoth and other remains in Endsleigh St. &c.". *Q.J.G.S.* *48* (1892), 453-68.

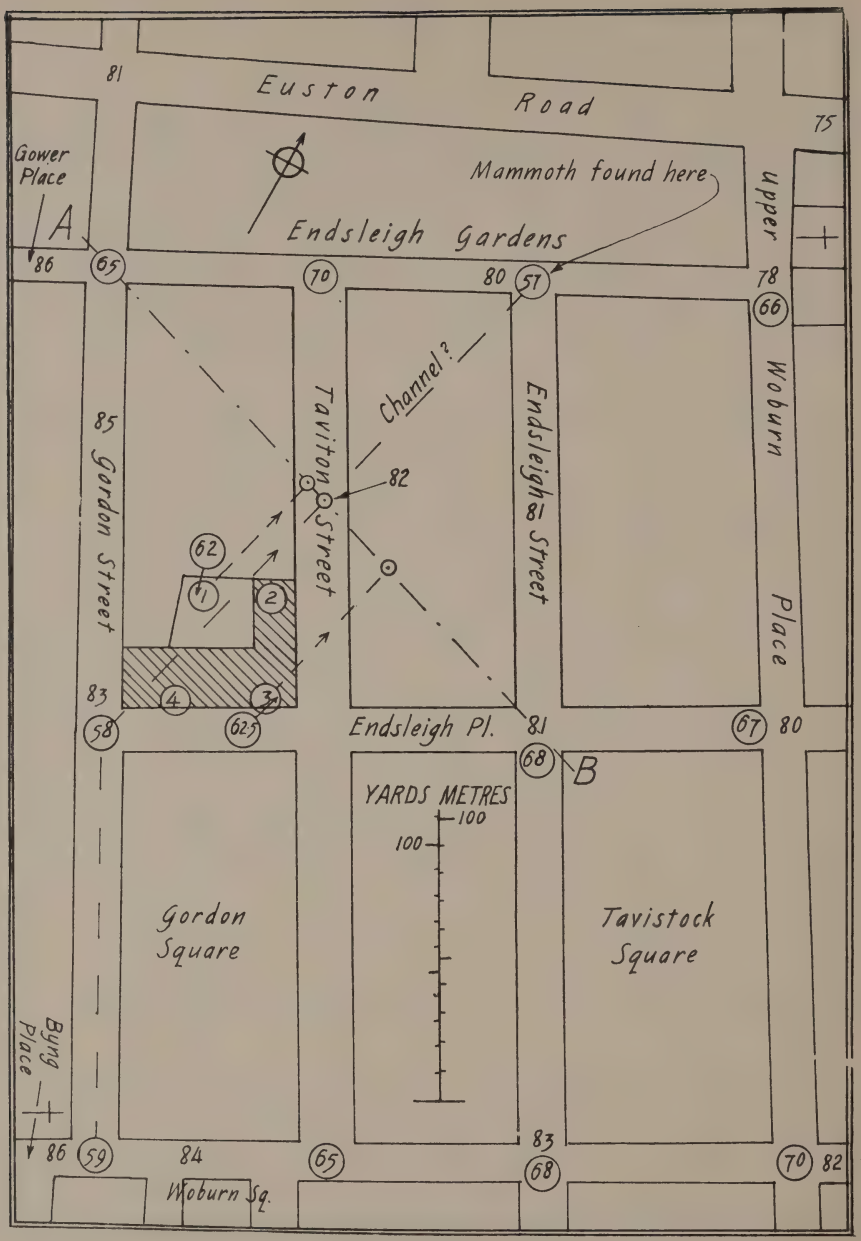


FIG. 2.
Nos. 31-34 Gordon Square: plan of area.
Site of Institute shown hatched; A-B, line of profile (fig 3); surface heights (O.D.) (bare); London clay surface heights (circles).

Clay as being of glacial origin, but their more orthodox interpretation as river sediments was voiced by Whitaker[2] in 1901, and to-day this is clearly seen to be correct.

Hicks' published sections are of great interest. They show the considerable variations in height of the London Clay bench on which the fluviatile deposits lie and enable us to reconstruct in outline the topography of that surface in our immediate neighbourhood. The sections do not, unfortunately, give exact levels of the bench or of the river deposits at any point. The vertical scale is much exaggerated (as must be the case) but the degree of exaggeration varies slightly from one drawing to another in the printed versions. The author does, however, give the maximum and minimum thicknesses of the beds depicted in each drawing, so that, given the surface spot-heights shown on this map (*ibid*, p.454), one can calculate, within a foot or two, the levels in the sections at any point by measurements on the drawings.

Relating the figures obtained in this way to the street-plan (Fig. 2, re-drawn after Hicks), the road-surface levels are shown bare and those of the London Clay surface are ringed. To Hicks' data are added those obtained from the contractor's trial holes on the Institute site, which are quite consistent with the former, showing that no gross error has been made in estimating levels from Hicks' drawn sections.

The plan shows that the present ground-surface slopes gently from south and west, falling from 86 ft. O.D. at Byng Place, in the south-west corner, to 75 ft. in Euston Road near St. Pancras Church, a distance of just over a quarter of a mile. There is a rather steeper fall from 86 ft. in Gower Place, near the north end of Gordon Street, to 80 ft. in Endsleigh Gardens at Endsleigh Street, which is less than 200 yds. and to 81 ft. in Euston Road, less than 100 yds. northwards.

The London Clay surface, on the other hand, is much less regular, there being, for example, a difference of 13 ft. in level between the north ends of Taviton and Endsleigh Streets, a matter of only 80 yds. These are, in fact, the extreme values noted in the area. The key to the matter seems to be that the three deepest ' soundings '—59, 58, 57 ft. O.D.—suggest the existence of an elongated depression, trending northwards, extending from Byng Place, via Gordon Square, at the south-west corner of the Institute building, to the north end of Endsleigh Street, site of the mammoth discovery. Nothing so far proves that the three points are really connected. They could easily represent separate basins in the Clay, but their slight fall to the north and east and the apparent banks of London Clay at higher levels, to the north-west and south-east (70 ft. at the north

[2] Whitaker, W., *Proc. Geol. Assoc.*, *17* (1901), 94-5.

end of Taviton Street, 68 ft. in the north-west corner of Tavistock Square) do point to their interpretation as parts of the channel of a former stream, which seems, in that case to have passed directly across the site of our building.

On the assumption that such a channel exists, running between the sections seen by Hicks at the north-west corner of Gordon Square (bench at 58 ft. O.D.) and at the north end of Endsleigh Street (bench at 57 ft. O.D.) an almost true transverse profile of it should be found along the line A-B on the plan, running from Gordon Street, by the Endsleigh Hotel, to the north-west corner of Tavistock Square. The two end-stations are known and if the sections from two of our trial-holes (Nos. 1 and 3) and that at the north-west corner of Gordon Square are projected northwards, parallel to the presumed course of the channel, the profile shown in Fig. 3 is obtained. Defined as it is by only 5 points at which sections have been seen (one of these, T.H.1, being very deficient in its upper

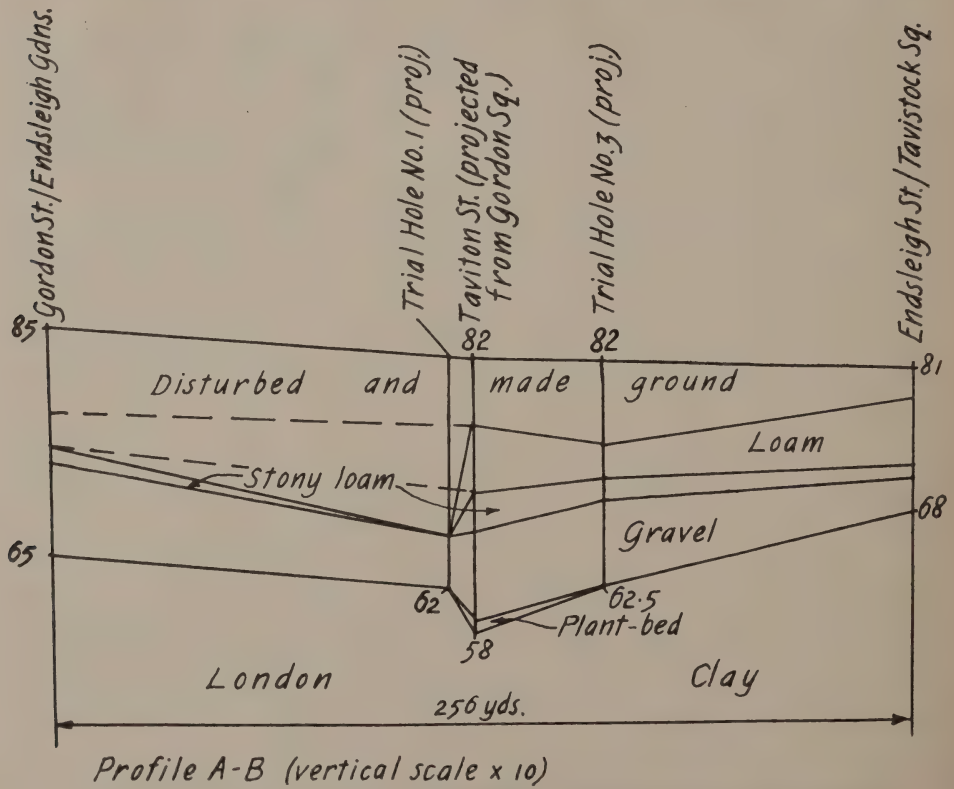


Fig. 3. Nos. 31-4 Gordon Square: profile (part projected) on line A-B (Fig. 2.)

part owing to modern disturbance) the diagram is nevertheless fairly convincing. The possible former run of the beds. discounting their absence today in T.H.1, is indicated by dotted lines. The most important feature is in the profile of the London Clay bench, showing a shallow valley, in which the plant-bed is present only at the deepest parts.

Further exposures in the future will, perhaps, confirm this feature. One in the middle of Taviton Street would be desirable!

The average level of the bench below the fluviatile deposits, calculated from these figures, is 64.4 ft. O.D. This figure corresponds very closely with one obtained from the section exposed, in 1959, at the site of the new Engineering building of University College, on the corner of Gower Street and Torrington Place. I am indebted for details of this to Miss A. Rosenfeld and Miss M. Collins, who sketched the section and took samples.

Beneath 2 ft. of disturbed material, with a surface at 83.5 ft. O.D., lie thick deposits of river-sand and gravel, the loam topping them in our sections being absent. These lie on a bench of London Clay at 64.2 ft. O.D. As a matter of interest, the visible section is extended by a bore down to the surface of the Reading Beds, exactly at O.D., proving a thickness hereabouts of 64 ft. of London Clay.

Two samples of the floodloam were taken in Trial Hole No. 4 (See Fig. 1, right) in the hope of explaining the curious feature of its complete decalcification at the base. These were thin-sectioned by Mrs. M. Barton, and their microscopical features are discussed below.

The floodloam must, at its deposition, have contained numerous calcareous bodies—grains of chalk, derived by the river from outside the area of the Lower Tertiaries, as well as locally-living freshwater and land shells. The calcium carbonate provided by these now survives mainly in a secondary condition as concretions (the 'race' of Hicks' terminology) lining and filling fissures, where it has clearly been deposited from solution by percolating surface-water, having been taken up in higher layers (now missing) from the primary bodies. These upper layers must, as a result, have been largely decalcified, indicating a fairly long period of chemical weathering under a temperate climate since the formation of the loam—i.e. since the maximum of that stage of river-aggradation. While such a decalcification at the former surface of the loam was to be expected, the sharply-defined (6 ins. thick) zone of complete decalcification at its base came as a surprise. This must be due to a kind of 'weathering-from-below' by comparatively acid groundwater, a phenomenon that is here reported for the first time from the British Isles. Professor Zeuner[3] observed a similar weathering of the underside of a floodloam at Johnsbach near Wartha, Silesia, where oxid-

ation had penetrated into the blackish-clay from underneath. In this case both gravels and clay were in all probability free from calcium carbonate from the start. There are other localities in south-west Germany where decalcification of the floodloams has taken place from the underlying Rhine gravels. In the case of Endsleigh Gardens decalcification was not accompanied by any oxidation such as would normally take place at the surface. On the contrary, the gleying of the natural fissures in the loam remained very prominent.

Thin sections of floodloam samples (Plate 2)

Upper sample (1a, b). The calcareous part of the loam is seen, in thin section, to consist largely of rounded, ovoid bodies, 0.5 mm. in diameter or less, of clay material permeated with colloidal ferric hydroxide showing flow-structures. These are, presumably, water-rolled masses of London Clay derived from the sides of the valley and the bed of the river. The Clay had previously been weathered under a warm/moist climate (perhaps sub-tropical) to a soil of braunlehm or even rotlehm type. This weathering may have been long antecedent (?Tertiary) to the redeposition of the derived material. The upper sample shows the presence of small chalk grains (original) and numerous irregular masses and veins of secondary calcite, with local gleying. The outlines of the clay-masses are fairly sharp and there is much quartz, mostly in the fine-sand grade (0.2–0.06 mm.). Larger quartzes, up to 0.4 mm. are conspicuous, but few in number. Colloidal iron is widespread and plentiful in the finer matrix as well as in the clay-bodies. Despite the undoubted alkaline conditions during the infiltration of the secondary calcium carbonate, the colloids were not flocculated, so that they must have been protected by silicic acid, in the manner described by Kubiena,[4] which is freed only under relatively warmer climatic conditions than those prevailing to-day. Such was, one must suppose, the climate when the floodloam was being deposited and subsequently weathered *in situ,* clearly that of an Interglacial or Interstadial period.

Lower sample (2a, b). Being decalcified, the material consisted of the clay-bodies described above and quartz grains, the latter being more prominent owing to the increase in their proportion of the whole on removal of a very considerable percentage of calcium carbonate. The gleying of fissures and channels was more marked than above. Reduction of iron-compounds in the interstices was accompanied by some actual eluviation, so that these areas of the section, instead of being, as one would expect, dark blue or black, are almost colourless, even under

[3] Zeuner, F. E., "Eine altdiluviale Flora von Johnsbach bei Wartha," *Centralbl. f. Mineralogie &c.*, Abt. B, No. 5, 1929, 179-181.
[4] Kubiena, W. L., *Soils of Europe*, (London, Murby, 1953), pp. 219 ff.

crossed nicols, where, in Sample 1, there is plentiful colloidal iron in the matrix. The outlines of the original clay-bodies are somewhat blurred, showing that the attack of the groundwater extends to them also, and their colour, even under crossed nicols, is no longer always a lucent orange, but a denser, rustier brown, indicating some partial change in the constitution of their iron, which must be due to the ground-water effect. This may be an incipient flocculation of the colloids caused by the acidification in this zone which is shown by the decalcification. Increased acidity (or rather lessening alkalinity, well below pH 8.0, but not necessarily much below 7.0) perhaps disturbs the protecting silicic-acid sol of the original braunlehm. (Plate 2).

Conclusions

The changes observed at the base of the floodloam could have occurred at any time between the formation of the river floodplain at the Endsleigh Gardens Stage and the first urbanization of the area, but they must have been due to a water-table high enough to drown the gravel completely and invade the loam from below. The conformation of the London Clay bench, here recorded, and the supposed existence below our site of a somewhat deeper channel in it, make it unlikely that there was any serious impediment to drainage of groundwater in later times. In fact, the uniformly oxidized appearance of the gravel, right down to its base, shows that there has, on the whole, been free drainage in recent times. No alteration of these bench-features since the deposition of the gravel can be envisaged as a serious possibility, so that the present situation is likely to have prevailed from the time when the Thames began to cut its valley down below our level.

The bench of the Endsleigh Street site as recorded by Hicks was included by Zeuner[5] in his Bench J of the British Museum section. Comparison of our bench-levels with the original records of Zeuner's transverse section VI of the Thames profile (British Museum Section) brought out a further interesting correspondence. This composite section followed a straight line from the north-east corner of Regent's Park to a point just west of Waterloo Bridge, in our neighbourhood running exactly down Huntley Street and across the middle of Bedford Square, i.e. parallel with Gordon Street and two blocks to the south-west of it. On to this line were projected, from either side, bench-levels on the London Clay from well-records and other sections lying within half a mile of it.

Two well-defined groups of levels were thus recorded: one of eleven values

[5] *The Pleistocene Period*, (London, Hutchinson, 1959), p. 356.

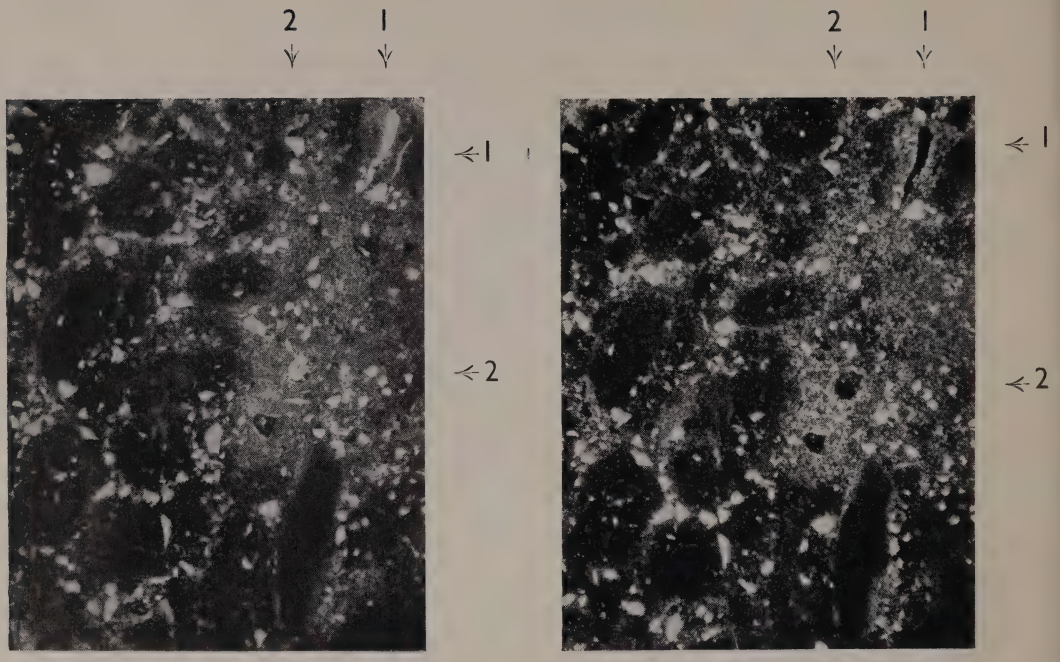
between extremes of 65 and 72 ft. O.D., average 64.7 ft. O.D.; the other of 15 values, extremes 57 and 64 ft., average 59.9 ft. O.D. The upper of these forms part of Zeuner's J-bench in the longitudinal profile, the lower evidently marks the base-level of our channel and others like it in the neighbourhood. Since both are alike covered by the gravels, they must be substantially of the same age. This bench is younger than that of the Swanscombe aggradation, which at this point should lie at 95 ft. and older than the Taplow bench at about 20 ft. O.D. It is, therefore, one of the benches intermediate between the formation of the Boyn Hill terrace bench of Antepenultimate Glaciation 2 age and the Taplow bench of Penultimate Glaciation age. It thus appears that the Endsleigh Gardens Stage of gravel aggradation up to a proved height of 81.5 ft. at the corner of Gower Street and Torrington Place is intermediate in time between these two Glaciations. Since the original features of the loam denote a climate at least temperate in character, perhaps somewhat warmer, in summer at least, than at the present day, it is likely to belong to some phase of the Great Interglacial. From the evidence of groundwater action it could hardly be later.

The Endsleigh Gardens fluviatile terrace is not the only series of deposits occurring at this intermediate position between the Boyn Hill and Taplow levels. Another, and classic, example is the Stoke Newington Common[6] sands and gravels, lying downstream on the same London Clay bench at about 65 ft. O.D., with surface levels between 80 and 85 ft. and undisturbed river deposits reaching to about 80 ft. O.D. at their maximum preserved height. These contain Middle Acheunan implements, some clearly derived from the higher Boyn Hill Stage, but others, of somewhat more evolved types, evidently *in situ*. The firm dating of this, and other similar cases, is of some importance for the history of the later Lower Palaeolithic people in southern England.

The Stoke Newington and Essex deposits beyond the Lea valley seem to be followed immediately by a major glacial phase, since the material above the river deposits is 'contorted drift', a product of frozen subsoil, which has involved disturbance of the uppermost part of the fluviatile series. According to the currently accepted Lower Thames sequence, this phase should be the first part of the Penultimate Glaciation (= Riss I), and, if so, Stoke Newington would appear to fall at the end of the Great Interglacial. This provisional date may be transferred to the Endsleigh Gardens Terrace, on the evidence of the close correspondences both in bench-levels and of the proved heights of undisturbed fluviatile deposits.

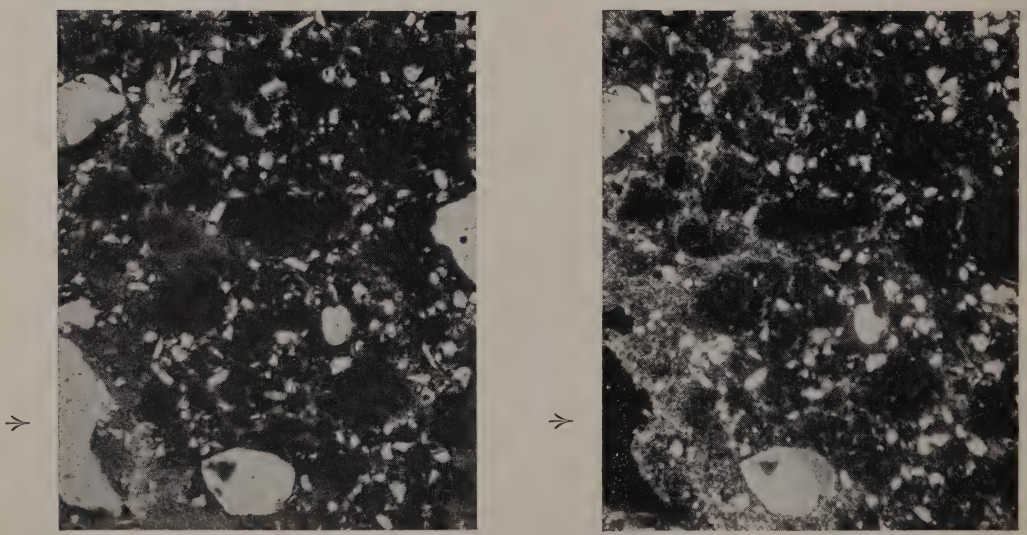
[6] Smith, W. G., *Man the primeval savage*, (London, 1894), Chap. 14, p. 187 ff.

PLATE 2



1a *1b*

5 mm.



2a *2b*

31-4 Gordon Square, W.C.1: floodloam in thin section
1 a, b, upper sample; *2 a, b,* decalcified sample
a, in ordinary light; *b,* same fields under crossed nicols
All ×7.5 linear *Photos I.W.C.*

DESCRIPTION OF PLATE 2

Micro-photographs of floodloam samples in thin section.

1*a*, 1*b*. Upper (calcareous) sample. Two views of the same field, in plane-polarized light and with crossed nicols, respectively.

The rounded clay masses are prominent. The interstices between them show light, even in 1*a*, and are strongly luminous under crossed nicols. Two chalk pebbles in the field stand out well in a colour-photograph but are indistinguishable in tone from the background in monochrome. There is a concentration of secondary calcium carbonate round the conducting channels (at intersections of pairs of arrows). The small, angular bodies are quartz-grains. 2*a*, 2*b*. Lower (decalcified) sample. Two views of the same field, in plane-polarized light and with crossed nicols, respectively.

Some larger rounded quartzes may be seen (that in the middle of the right-hand margin is in extinction in 2*b*). There is a large open fissure (arrowed) in the left-hand bottom corner. The pale area round it and the interstices between the clay bodies are bleached on the left. This is the result, not only of iron-reduction by gleying, but, apparently, of some eluviation of iron-salts by acid groundwater. The darkness of the finer matrix elsewhere in the field shows that calcium carbonate has been removed. The difference between the appearance of the bleached zone and that of carbonate-concentration in 1*a* and 1*b* is not very convincing in the black-and-white print, but is quite clear to the eye viewing the original section and in a colour-transparency.

1*a*, 1*b*, ½ sec.; 2*a*, 2*b*, 5 secs. exposure. F.P.3 fine-grain film. All on the same scale.

(*Photo I.W.C.*)

Thin Sections of Prehistoric Pottery: An Empirical Study

by H. W. M. Hodges

The cutting of thin sections of pottery and their subsequent examination under the microscope is, of course, not a new technique. The method is used extensively in the ceramic industry today,[1] but most of the data available relates to pottery fired at relatively high temperatures, and since they are of little economic value, ceramics fired in the terra cotta range remain largely unstudied.

Broadly speaking, two distinct types of information may be gathered from thin sections. In the first place, minerals contained in the clay body may be identified, and from these conclusions be drawn as to the origins of the clay or its filler.[2] This approach has been used occasionally by prehistorians in Britain[3] and on the Continent[4] as well as in the New World.[5] It is hoped before long to publish some results obtained following this line of enquiry. On the other hand, thin sections may reveal data that allow one to draw conclusions about the technique by which pottery has been made. The possibility of this has already been demonstrated by the study of polished sections,[6] but it is in this field that one lacks comparative data, and the present study is an attempt to answer some specific problems of the technology of prehistoric pottery, while at the same time providing the essential comparative material.

The method adopted has been to prepare a body of known composition, to treat this in a specific manner, and to fire under controlled conditions. For this purpose test sherds measuring $1\frac{1}{2}$ by $\frac{3}{4}$ by $\frac{1}{4}$ ins. were made or cut from pots and fired in an electric muffle kiln. Firing conditions were thus normally oxidizing, but where reducing conditions were required damp sawdust was introduced into

[1] See for examples G. R. Rigbley, *The Thin-Section Mineralogy of Ceramic Materials*, London (1953).

[2] By "filler" is meant the non-plastic inclusions deliberately worked into the body. In passing it should be noted that we have no generally agreed term for this type of material. A second term is also needed to describe non-plastic inclusions naturally occurring in clays.

[3] See, for example, H. H. Thomas in *Proc. Devon Archaeol. Explor. Soc.* I (1929-32), 175.

[4] W. Buttler and W. Haberey *Die Bandkeramische Ansiedlung bei Köln-Lindenthal*, Berlin (1936), 123.

[5] Anna O. Shepard, *Ceramics for the Archaeologist*, Washington (1956), 139-40, 156-168.

[6] R. B. K. Stevenson in *Man*, 53 (1953), 65-68.

the kiln.[7] The clays used were a fine Wealden clay containing little colloidal iron and a sandy London clay containing a fairly high quantity of colloidal iron.

Because many of these test sherds and most prehistoric pottery are so friable it was found necessary to impregnate before sectioning. The method used was that already developed for the preparation of sections of soils and sediments.[8]

The technological problems that it was hoped to answer fall into three main groups:—

1. Methods of construction. Apart from wishing to be able to distinguish between hand-built and wheel-thrown pottery, the aim was to discover whether pottery that had been ring-built could unfailingly be distinguished from other wares as, for example, those made from a single lump of clay.
2. Methods of surfacing. Here the aim was to see if one could distinguish between plain, wet-hand (slurry), and slipped surfaces.
3. Firing conditions. The aim here was to see what could be learnt about the temperatures at which and atmospheres in which prehistoric pottery was fired, as indications of the types of kiln used in antiquity.

Methods of Construction

A sample of clean clay, containing a few natural, small quartz inclusions, was well wedged, rolled, and these rolls shaped into a ring-built pot. From this a sherd was cut and fired at 650°C, the sherd containing one of the ring joins. A further sample of the same clay was thrown on the wheel to form a small pot sherd, was cut, and fired as was the first. The ring-built sherd was sectioned vertically, the wheel-thrown horizontally. Even knowing exactly where to look for the join in the ring-built sherd, it was impossible to detect anything that would suggest this method of manufacture. In the wheel-thrown sherd there was a marked orientation of the larger inclusions with their long axes parallel to the sides of the sherd.

Failure to detect the joins in the ring-built sherd was probably due to the very homogeneous nature of the clay, and it was decided to wedge into the same sample a small quantity of white clay, being careful not to mix too thoroughly, and to repeat the experiment. Firing and sectioning were carried out as before. The joins were now visible in the ring-built sherd where streaks of white clay crossed the sherd from one face to the other in arcs, clearly a pattern that had developed during the rolling of the rings. On the surface, where a rib had been

[7] Anna O. Shepard, *op. cit.* p. 370, objects to the use of the term "fired in an oxidizing atmosphere" as applied to the primitive kiln since the term is an over-simplification of very complex—and ill-understood—circumstances. So long as it is appreciated that this is the case, there seems to be no justification for abandoning the term.

[8] I. W. Cornwall, *Soils for the Archaeologist*, London (1958), 142 ff.

used to face the pot, a definite vertical flow pattern had developed. In the case of the wheel-thrown pot a far more pronounced horizontal flow structure had developed throughout the whole sherd.

It is clear that one must be very cautious before pronouncing that pottery has not been ring-built on the basis of the absence of evidence of ring-joins. Extensive use of the rib, as for example where the pot has been drawn-up using the paddle-and-anvil technique, may cause the development of so emphatic a flow structure as to obscure the ring-joins, even though conditions were such as might have allowed them to be apparent in the first case. In fact, it would probably be true to say that in homogeneous bodies such joins are not normally visible in thin section. More work needs to be done to ascertain why such joins can be seen from time to time.

The only examples of prehistoric pottery showing clearly defined ring-joins that it has been possible to examine so far have been two sherds of primary neolithic ware from Whitehawk Camp. In both cases fine fissures had developed along the line of the ring-joins. Slight breakdown of the clay minerals of the body was to be seen on both sides of the fissures, and as will be discussed below, this certainly shows that the fissures developed during firing. What caused this incomplete fusion of the body is not easy to determine, but it is possible that some organic matter may have adhered to the surface of the rings, perhaps during the rolling-out process, and that during firing this matter was burnt out.

While it is quite clear that mere absence of any sign of ring building cannot be taken as evidence that the technique was not used, especially where one is considering a body of homogeneous nature, there should be no such difficulty in determining whether a pot has been hand-built or wheel-thrown, unless all the inclusions are of equiaxial dimensions, since particles will show horizontal orientation, in wheel-thrown pottery, while in poorly wedged bodies a horizontal flow structure will develop.

Methods of Surfacing

Initially nine sherds were prepared, three of natural clay, three of the same clay mixed with builder's sand, and three of the same clay mixed with freshly ground flint. Of each batch one was left unsurfaced, one was given a wet-hand (slurry) finish, and the third was slipped in the same clay. A further batch, produced later, was slipped in white clay. All were given an identical firing of a steadily rising temperature to 750°C after one hour.

On sectioning it was found that the batch containing fresh flint presented a very curious appearance, quite unlike anything to be seen in prehistoric pottery, with a mass of very sharp flakelets often thin and pointed. Clearly fresh flint

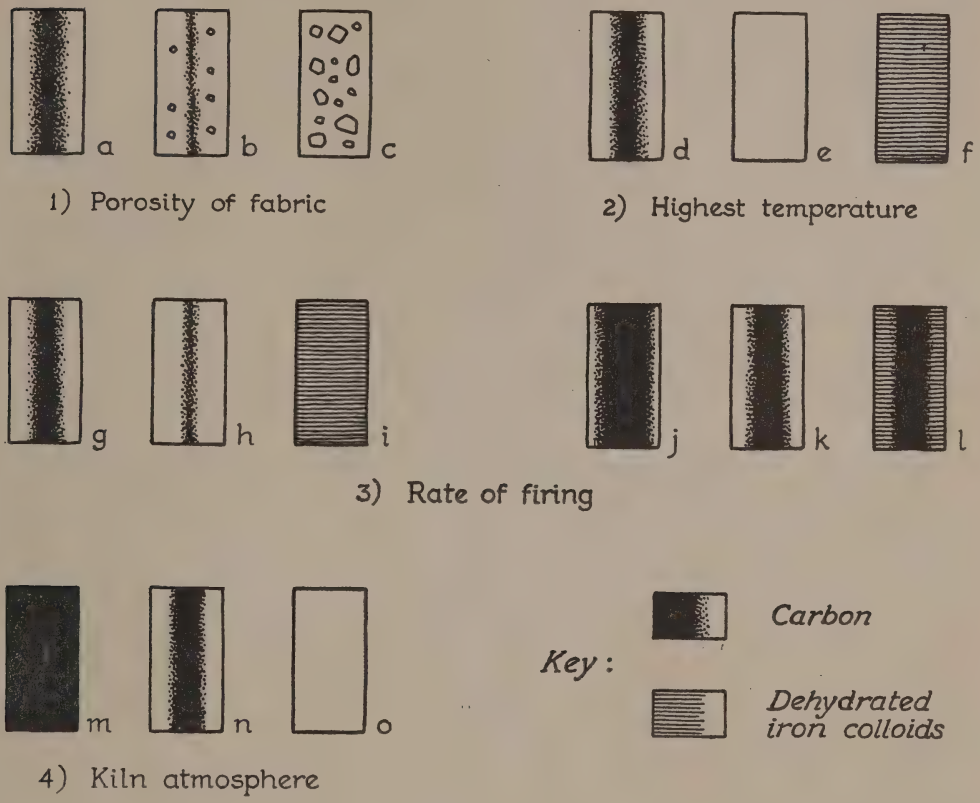


Fig. 1. Diagram to show the factors influencing the density of thin sections of pottery.

a, dense fabric, b, coarser fabric, c, very coarse fabric, all fired to 500°C in 40 mins.

d, dense fabric fired to 500°C in 40 mins; e, to 650°C in 60 mins; f, to 950°C in 100 mins.

g, dense fabric fired to 500°C; h, to 750°C; i, to 950°C, all after 40 mins.

j, dense fabric fired to 500°C; k, 750°C; l, 950°C, all after 5 mins.

m, dense fabric fired to 650°C in reducing atmosphere; n, dense fabric fired to 650°C intermediate atmosphere; o, dense fabric fired to 650°C oxidising atmosphere, all after 60 mins.

could not generally have been used for this purpose in antiquity. A replacement batch of sherds was prepared using, this time, calcined flint. The result was seen to be far more like prehistoric products on sectioning.

Those sherds that had been slipped in the same clay as the body were found to show no clear demarcation between the slip and the body. The contrast, on the other hand, between slip and body in those sherds slipped in white clay was very clear.

In the green-hard stage, and after firing, it was observed that those sherds with a slurry finish appeared to be lighter in shade than the others. This was found to be due to a surface concentration of clay minerals, presumably drawn to the surface during the finishing process.

In view of the fact that it has sometimes been claimed that Beakers generally, and Bell-beakers in particular, have a slipped surface, it was decided to section a sherd of cord-decorated Bell-beaker.[9] This vessel had the characteristic deep red and rather smooth surface of many of its class, a surface darker than the body. It seemed unlikely, therefore, that the surface resulted from a wet-hand finish. Equally, because the cord-decoration was so sharp, it seemed unlikely that the pot had been slipped; and yet, even under the hand-lens the surface seemed to be distinct from the body. In thin section the cause of this distinction was clearly seen to be due to the breakdown of clay minerals on the surface of the vessel only. As will be shown below, such a state can be achieved by a fairly rapid firing to a relatively high temperature. While one cannot generalise on the basis of a few specimens it is as well to realise that many so-called slipped surfaces may well denote nothing more than such a surface breakdown of the clay minerals; and in this particular instance the vessel may equally have been given a wet-hand finish which would account for the smooth surface while allowing a concentration of clay minerals on the surface.

Firing Conditions

In pottery fired at low temperatures two features may give some indication of the firing conditions: the quantity and location within the sherd of unburnt carbon and the presence of altered clay minerals. Both give density to the thin section. The quantity of organic matter and of clay minerals originally present in the fabric is, admittedly, unknown but if these were the only variable factors, interpretation would be a relatively simple matter. As it is, other major factors enter into the picture: notably the porosity of the body, the rate and highest temperature achieved during firing, duration, and the kiln atmosphere.

[9] V. G. Childe, *The Danube of Prehistory*, Oxford (1929), 188: " . . . a fine fabric covered with a brilliant red slip and nicely burnished."

In an attempt to discover what useful information could be gained from this approach, a great number of different firings were carried out, the results of which are summarised below and in the diagram (Fig. 1).

1. *Porosity of Fabric*

Generally speaking the more porous the fabric the more readily was the with different proportions of sand backing under the same kiln conditions. carbon burnt out. This was shown by firing sherds of the same clay but

2. *Kiln Atmosphere*

Under extreme reducing conditions little or no carbon was burnt out; under extreme oxidizing conditions it was all burnt out quite readily. Thus sherds fired in a crucible packed with damp sawdust showed, as one would expect, uniform carbon throughout. Sherds fired in the electric kiln with no sawdust present very quickly lost all carbon. Since neither extreme could represent the normal conditions of a primitive kiln, firings were carried out with the introduction of varying proportions of sawdust—damp and dry—and as might have been anticipated, volume for volume, the damp sawdust invariably inhibited the burning out of carbon more than the dry. In fact, to achieve the same results at the low temperatures being worked (650°C) it was found necessary to quadruple the proportion of dry sawdust to damp. Translated into terms of primitive kilns, the nature and condition of the wood used probably had as much effect on the amount of residual carbon as the type of kiln used.

3. *Duration of firing*

The length of time for which any particular fabric was fired, provided conditions allowed the burning out of carbon, obviously affected the residual quantity. Firing over a short period resulted in the burning out of very little carbon; after a prolonged firing it was all removed.

At higher temperatures, however, the effects of heat on the clay minerals had to be taken into account. Clay minerals are yellow and translucent seen in thin section under crossed nicols: on breakdown they become red and opaque. Identical sherds were brought to 650°C and the temperature maintained for four hours, a sherd being removed at half-hourly intervals. Alteration was not seen even in the last sherd to be removed, and it would seem that as far as we are concerned breakdown may be seen chiefly as the result of high temperature during firing.[10]

[10] G. R. Rigbley, *op. cit.* p.102.

4. *Rate of firing*

The need for slow and steady temperature climb in the kiln, so often emphasised by the modern hand-potter, has probably done much to obscure the fact that the truly primitive craftsman allows a very rapid temperature rise, followed by a slow cooling.[11] A dry brushwood bonfire will come to maximum temperature within twenty minutes, and indeed it would be difficult to prevent it doing so. These conditions are difficult to simulate in an electric kiln, but sherds fired rapidly in a gas injector furnace, which can be brought to top heat more quickly, and others placed in the electric kiln already firing just below 900°C, and brought up to 950° within a few minutes, reproduced an effect not uncommonly seen in thin sections of prehistoric pottery. The outer surface of the sherds showed alteration of the clay minerals while the interior still contained much unburnt carbon, or, where the rate of temperature climb was not quite so rapid, alteration of the surface was seen over a body in which all or most of the carbon had been burnt out but in which the clay minerals on the interior remained intact. Where the rate of temperature rise was less rapid breakdown took place evenly throughout the body.

It may seem that with so many imponderables to take into account this approach to the study of prehistoric pottery is doomed to failure. Certainly the method will not provide an answer to all the questions regarding firing conditions that one might care to ask; but provided one is prepared to accept the many limitations of the method, some useful information can be gained from this source. It is evident that the greater the number of imponderables that can be eradicated from the discussion, the greater the reliance that can be placed on the observations made. The method is thus most useful for comparative purposes by which one may, for example, study a group of sherds of identical fabric, thus eliminating porosity as a variable factor to be taken into account, or different fabrics that were demonstrably fired at the same time, so eliminating the possible variations between one firing and another.

An example of the later type of examination may be seen in that of a clay mould from bronze implements of Late Bronze Age date from Dalkey Island.[12] This was typical of two-piece moulds of the period with a fine inner sheath of clay backed with fine sand, and an outer envelope of clay backed with fine sand, and an outer envelope of clay backed with much coarser materials. It had been suggested that this mould was used simply for the casting of wax models to be

[11] Anna O. Shepard, *op. cit.* pp. 77-91.
[12] Fragments kindly provided by the excavator, Mr. David Liversage.

used in the *cire perdue* process.[13] Had this been the case one would have expected to find a uniform firing of the whole fabric, probably at a low temperature. In fact the fabric of the inner sheath showed almost complete breakdown of the clay minerals, while the outer envelope, despite its more porous nature showed only slight alteration of the clay minerals. It is an inescapable conclusion that the inner sheath must at some time have been submitted to a relatively high temperature, a temperature in excess of that applied to the outside envelope. Such a state of affairs would be consistent with the use of the mould for the direct casting of bronze.

Because of the very great variation of raw materials used by prehistoric man it is nearly always possible to find fabrics in use in different periods that, if not identical, are at least approximately comparable. Thus, although primary neolithic wares are generally of a coarser fabric than that used in the making of Bell-beakers, there are nevertheless sherds from early Neolithic sites that show a fabric of comparable fineness. When sherds of these finer neolithic wares are compared with those from Bell-beakers it becomes evident that fabric is only a single point of difference between the two. As has so often been pointed out, Bell-beakers as a whole are the better fired, better fired in the respect that more of the carbon has generally been burnt out and that almost complete breakdown of the clay minerals is often to be seen on the surface. This would suggest that firing took place in strongly oxidizing conditions, causing the carbon to burn out rapidly, and that a high top temperature was attained fairly rapidly but not maintained, so allowing alteration of the surface clay minerals only. Such conditions could be met with in a bonfire employing dry brushwood. The high proportion of residual carbon and the fact that the clay minerals are never seen to be much altered in the Neolithic wares would suggest a firing at a very much lower temperature under conditions that lie somewhere between the two extremes of oxidizing and reducing. Conditions of this kind are to be seen in the normal wood-fuelled cooking-fire, or indeed any fire on a flat hearth fed with logs rather than thinner timbers.

While this experimental work has so far been directed towards answering a few specific questions relating to Neolithic and Beaker wares, it must be emphasised again that one still lacks a sufficiently large body of data from which to work on general problems. No doubt in time this will be achieved. In the meanwhile this technique will allow one to answer some of the simpler problems, especially where it is in question whether a particular clay was used for the manufacture of a particular type of pottery. Further to this, by firing clays that are known

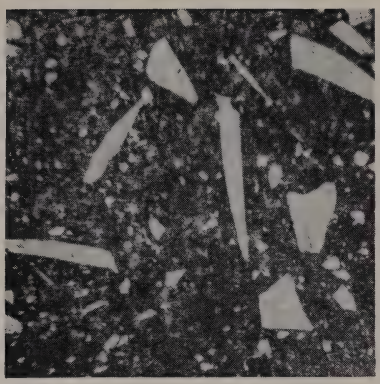
[13] Note by W. Fagg in *Man*, 58 (1958), 130.

to have been used for the making of pottery in antiquity under known conditions one should be able to simulate the products of the past, and thus to arrive ultimately at a more complete picture of early technology. For the immediate future this would seem to be the most promising line of enquiry.

ACKNOWLEDGMENTS

I would like to thank Mrs. M. Barton who undertook the laborious work of preparing sections of all the sherds used in this study: it is true to say that but for her skill and enthusiasm I would never have been able to achieve these results. I would also like to thank Dr. I. W. Cornwall for his never-failing encouragement and advice throughout the whole programme, and Miss Mavis Bimson for her very valuable comments on some of the problems of interpretation.

PLATE 3



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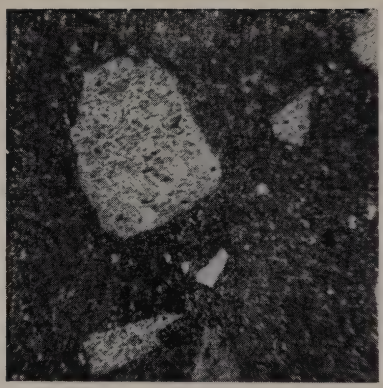

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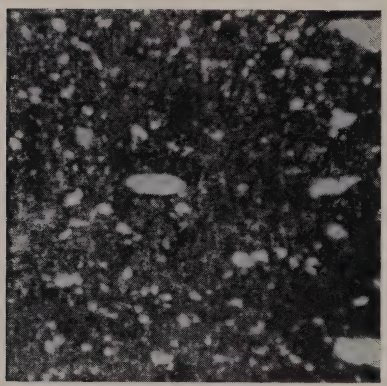

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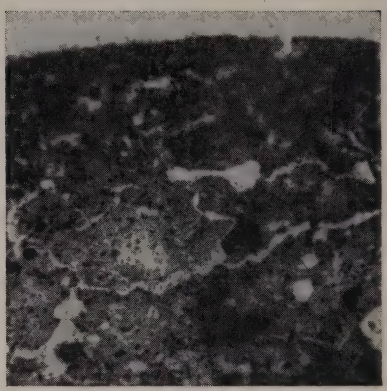

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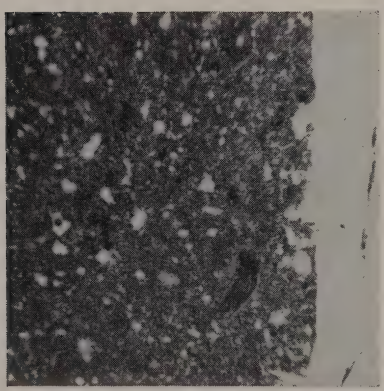

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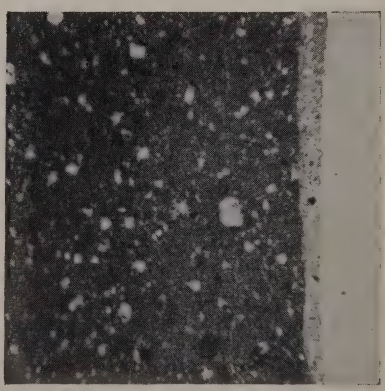

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PLATE 3

a Experimental sherd containing filler of freshly-ground flint. Note angular nature of flint inclusions. ×*10*

b Experimental sherd containing filler of calcined flint. ×*10*

c Experimental sherd of unfilled clay, wheel thrown. Note orientation of larger grains. ×*10*

d Cord decorated bell-beaker from Lincolnshire. Polarized light. Note alteration of clay minerals on surface. ×*10*

e Experimental sherd of red clay slipped in the same material. Note absence of clear demarcation between body and slip. ×*20*

f Experimental sherd of red clay slipped in white clay. Note clear demarcation between body and slip. ×*20*

PLATE 4

a Experimental sherd of red clay with unfinished surface. Note lack of contrast between body and surface. ×*10*

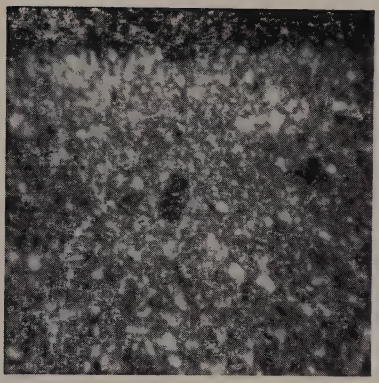
b Experimental sherd of red clay with wet-hand (slurry) finish. Note concentration of luminous clay minerals at surface. ×*10*

c Experimental sherd of red clay with poorly wedged inclusions of white clay. Wheel thrown. Note flow structure. ×*10*

d Experimental sherd of the same body as 3. Ring built. Section at ring junction. Note flow structure following original surface of ring. ×*10*

e Neolithic pottery from Whitehawk Camp showing junction of two adjacent rings. Note alteration of clay minerals either side of the fissure. ×*10*

PLATE 4



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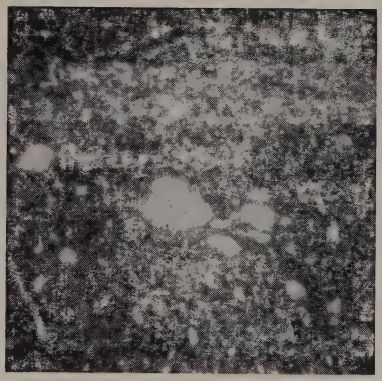

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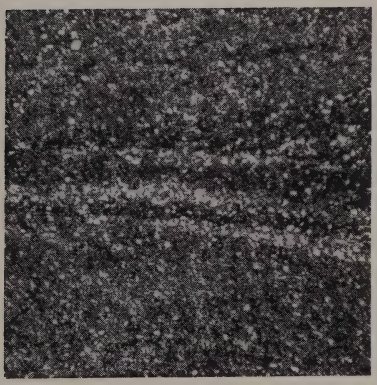

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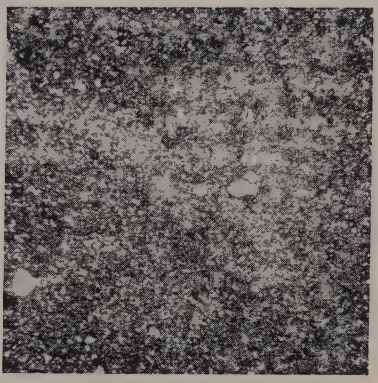

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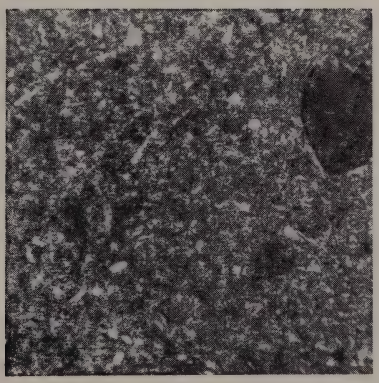

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Tree Ring Records from Britain

By Portia Wallace

In order to establish a tree-ring chronology for Britain it is necessary to measure large numbers of individual specimens. The success of the Huber School which has been working in W. Germany on oak has encouraged the writer to study a number of specimens, some of which are here published in the hope that more will become available, so that eventually a complete sequence can be constructed It will, however, be shown in Part I that difficulties are bound to be considerable.

I

17th Century Timbers from Lincoln's Inn Fields

Three specimens of oak timber were obtained from 59/60 Lincoln's Inn Fields, London and submitted for investigation by Mr. W. A. Eden, through Professor W. F. Grimes. The house was built in 1640 or thereabouts and the specimens must thus be older than this date. One specimen (DC8) showed only 10 complacent rings and was therefore useless. The other two (DC6, DC7) had ring series of 34 and 41 respectively. Both contained the centres of the trees, and one (DC6) had traces of bark also.

Both specimens exhibited great variation in ring width on different radii, so that a high measure of agreement was not to be expected. Several radii were therefore measured on each. The ring width was determined under the microscope to 1/50 mm and then rounded off to tenths of mm. Two plotting and interpretation methods were employed. A diagram of absolute ring widths was constructed for each radius separately and two radii were then compared and the agreement percentage calculated according to the modified Huber method (Zeuner, 1958). In specimen DC6 the three radii measured showed a remarkably small amount of agreement, although they were of the same tree and the years directly correlated. This tree, therefore, must have been putting on thickness around its periphery in a very irregular manner. DC7 showed much better agreement between the two radii measured. The second method employed was the skeleton plot method of Douglas and Glock which, as it omits the minor variations, made the picture much clearer. In cases of considerable variation in the same tree it appears that skeleton plots can still be used for correlation where the other strictly more statistical method fails.

Specimen DC6

Three radii were measured in the same transverse plane at angular distances of about 50°. The agreement percentage between radius I and radius II was 74%, the agreement between radius I and radius III 72%, and between radius II and III 77%. Since in the method here used an agreement of 65% or over is to be regarded as significant, these figures are highly significant. In radii of the same tree this may be expected, but it must be pointed out that radius II shows certain irregularities. In it ring 23 is missing altogether, and the group of broad rings between years 10 and 17 is represented by wide rings only between years 14 and 17. Rings 10 to 13 do not show the exceptional width manifested in the two other radii. It is remarkable that radius I and radius III agree more closely in this respect whilst the intermediate radius II is aberrant. This difference is a warning that single bore samples from different trees need not necessarily show agreement although they may come from trees of the same age.

Specimen DC7

Two radii were measured, covering 41 and 42 years respectively. This was due to the loss of a ring on the periphery of radius I. The two radii showed an agreement of 70%. A group of wide rings between years 8 and 12 was particularly marked and it was hoped that this might provide a clue to the dating.

Correlation of the two specimens

For the purpose of comparison mean diagrams were drawn for the three radii of DC6 and the two radii of DC7. DC6, although it had only 34 years, showed traces of bark, whilst DC7, with 41 years did not. The agreement percentage was calculated for 34 possible matches of the two diagrams as tabulated below.

DC6	ring	21	=	DC7	ring	41	(65%)	DC6	ring	34	=	DC7	ring	37 (48%)
,,	,,	22		,,	,,	41	(33%)	,,	,,	34		,,	,,	36 (34%)
,,	,,	23		,,	,,	41	(55%)	,,	,,	34		,,	,,	35 (48%)
,,	,,	24		,,	,,	41	(44%)	,,	,,	34		,,	,,	34 (69%)
,,	,,	25		,,	,,	41	(52%)	,,	,,	34		,,	,,	33 (64%)
,,	,,	26		,,	,,	41	(50%)	,,	,,	34		,,	,,	32 (48%)
,,	,,	27		,,	,,	41	(60%)	,,	,,	34		,,	,,	31 (38%)
,,	,,	28		,,	,,	41	(35%)	,,	,,	34		,,	,,	30 (52%)
,,	,,	29		,,	,,	41	(48%)	,,	,,	34		,,	,,	29 (59%)
,,	,,	30		,,	,,	41	(35%)	,,	,,	34		,,	,,	28 (61%)
,,	,,	31		,,	,,	41	(59%)	,,	,,	34		,,	,,	27 (41%)
,,	,,	32		,,	,,	41	(47%)	,,	,,	34		,,	,,	26 (33%)
,,	,,	33		,,	,,	41	(48%)	,,	,,	34		,,	,,	25 (60%)
,,	,,	34		,,	,,	41	(43%)	,,	,,	34		,,	,,	24 (58%)
,,	,,	34		,,	,,	40	(47%)	,,	,,	34		,,	,,	23 (56%)
,,	,,	34		,,	,,	39	(57%)	,,	,,	34		,,	,,	22 (41%)
,,	,,	34		,,	,,	38	(60%)	,,	,,	34		,,	,,	21 (62%)

It is usual to assume that the outermost rings of two specimens from the same building site are of approximately the same date, implying that they were cut in approximately the same year.

For our two specimens the assumption that the outermost rings are contemporaneous would mean that ring 34 of DC6 = ring 41 of DC7. The agreement percentage of 43% is, however, too near the chance value (50%) to be significant. In the calculation method here employed only agreement percentages over 65% should be regarded as significant. Only one of the 34 positions considered satisfies this requirement, it is the one in which ring 34 of DC6 = ring 34 of DC7. This is an unexpected result as it means that the centres of the two timbers belonged to the same year, and that DC6 was cut at least seven years earlier than DC7.

There is a considerable fluctuation in the remainder of the possible agreement percentages, between 33% and 65%. This fluctuation around the chance value of 50% is due to the presence of a series of rings in which wider and narrower ones alternate regularly. These raise the agreement percentage considerably at intervals of two years, whilst in the intervening positions the value is lowered. Needless to say, although these rings cannot be called complacent, such "complacent series" are of no significance. It is the sensitive groups representing more or less abnormal pictures, such as consistent groups of very wide or very narrow rings, that have to be taken seriously. In this respect a series of particularly broad rings strikes the eye. In DC6 radius I it comprises the rings 10-17; in radius II, 14-17; and in radius III, 11-17. In DC7, radius I, they comprise the years 8-12; and in radius II, 8-12 also. One is tempted to correlate the trees on the evidence of this figure. The following possibilities appear reasonable:

DC6 ring 34 = DC7 ring 31 (38%)
DC6 „ 34 = DC7 „ 29 (59%)
DC6 „ 34 = DC7 „ 28 (61%)

The agreement percentages are given in brackets and it is seen that they do not yield the high value obtained for the equation of DC6 ring 34 with DC7 ring 34. The above attempted correlation is based on the three individual radii of DC6, as they show the group of wide rings in somewhat different positions; the comparison of the mean diagrams is even less satisfactory.

It must be assumed, therefore, that the correlation DC6 ring 34 = DC7 ring 34 is the most likely. It implies that there was a series of years with favourable conditions for tree growth represented by rings 8-17. Since the building date is 1640, these years would correspond at the latest to the years from 1606 to 1616.

With a view to ascertaining whether there is any evidence for such a series early in the 17th century, I approached Dr. D. J. Schove, who kindly informed me that the group of wide rings is conceivably connected with the three favourable

years 1606-1608 known from climatic records. The evidence, however, appears to be mainly Northern Scandinavian and it remains to be seen whether the period

Fig. 1. Tree ring plots of British oak. Specimens DC.6, DC.7, DC.13.

of favourable conditions suggested by the broad rings in our specimen from Lincoln's Inn Fields will be substantiated by other British material.

II

12th or 13th Century Timber from Ashton Keynes, Wiltshire

Among nine fragments submitted to the Department of Environmental Archaeology by Group Captain G. M. Knocker, of the Ancient Monuments Department, one oak specimen, DC13, a radial fragment only 7.1 centimetres long showed no fewer than 70 rings. These were remarkably easy to count and the diagram is here reproduced in figure 1. There is a slight decrease in the mean annual increments. Broadly speaking the majority of the rings are near the average value. Exceptionally narrow ones appear in years 7, 28, 45, 47, and 64. A series of consistently broad rings covers the years 9-15 and another the years from 19-25,

but these can be regarded as one continuous series of broad rings from years 9-25. The diagram thus appears to have sufficient characteristics to be correlated with others of the same period should these become available.

The specimen comes from Hall's Close, Ashton Keynes, Wiltshire, a fortified manor of the 12th-13th century. The wood was found in the moat which was filled with clay and gravel.

III

15th Century Beams from Brooke House, Hackney [1]

Two slabs were obtained, through the kind offices of Professor Grimes, when Brooke House, Hackney, was being demolished. They are oak and belong to the building phase dated 1476. The external shapes of the specimens are different and they are therefore unlikely to come from the same beam.

DC22 has one hundred rings, DC23 only 76, but there is a peripheral inch or so of decayed wood almost completely destroyed by beetle larvae.

Specimen DC22

This specimen has a well preserved ring-sequence, though in places there are considerable displacements on the two sides of a ray. It appears that growth of certain sectors limited by two rays was slower or faster than in others. This irregularity is difficult to interpret and it has to be watched out for in other specimens. Along radius I (the radius measured) one observes a fairly complacent series to about year 25 from the centre, there follow about five narrow rings which on the radius measured are less narrow than about two centimetres away from it. A second series of conspicuously narrow rings occurs from ring 35 to ring 42, and a third from ring 48 to ring 50, followed by a conspicuously broad ring, 51, thereafter the series is on the whole complacent. The three groups of narrow rings just mentioned have an average distance of 10-11 years and may, therefore, express climatic fluctuations due to the sunspot cycle. There are narrow rings at year 7 and year 15 in the central portion of the beam, and these may represent the same cycle.

This beam certainly shows years prior to 1476, as there is no indication of bark preserved. The series of 100 rings should therefore, at the latest, represent the years from about 1370 to 1470, though of course it may be considerably earlier. The groups of narrow rings mentioned should be an aid in correlation.

[1] Brooke House, Hackney, was a late medieval house demolished by the London County Council following heavy damage by bombing in the Second World War. The building was studied architecturally during demolition and the site subsequently excavated. Main phases were thus established: the first (1476) builder not recorded; the second (1535) by Thomas Cromwell. For a full account see Survey of London xxviii, *Parish of Hackney* Pt. I (1960).

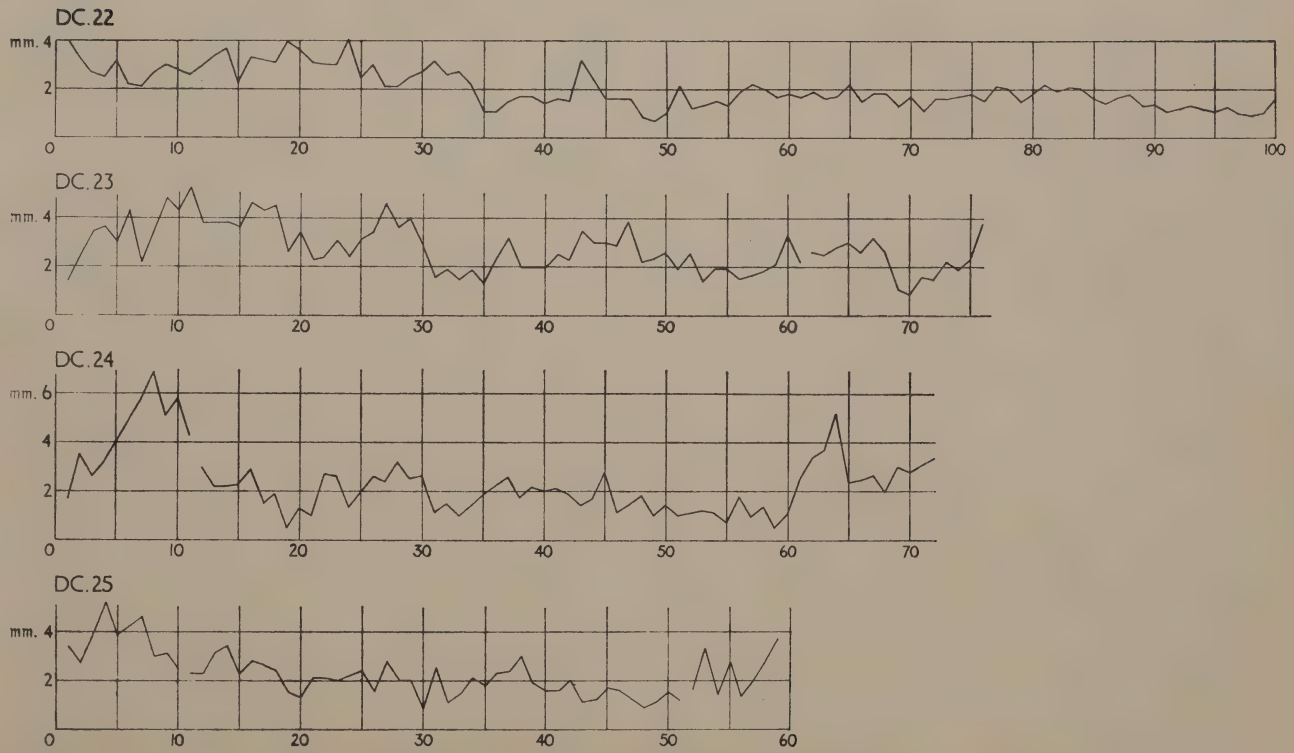

Fig. 2. Tree ring plots of British oak. Specimens DC.22, DC.23, DC.24, DC.25.

Specimen DC23

The ring sequence of this beam, too, is regular in so far as it is not disturbed by branches. But the spring wood of the rings is unusually wide, which makes the delimitation of the individual rings often rather difficult.

The 76 rings of DC23, when plotted, show conspicuous variation in width. When these are checked on the specimen, narrow series from 19 to 26, from 31 to 35 and from 53 to 58 appear to be significant. The broad ring of year 47 stands out particularly clearly. Near the centre of the specimen there is a narrow set from 12 to 15, and a narrow ring at 7. There is no clear periodicity in the sequence of the sets of narrow rings in this slab.

In comparing DC22 with DC23, certain limited stretches of the diagrams resemble each other, for instance, years 13 to 27 on DC22 agree with years 5 to 19 on DC23. The agreement is over 70% mathematically, and in fact much higher since the differences between rings 13, 14, 15 on DC23, compared with rings 21, 22, 23 on DC22 are of the order of a tenth of a millimetre only. If one accepts this high agreement, however, the remainder of the diagrams disagrees completely. There is no other combination that produces an obvious agreement at all, and one is inclined to admit that the two specimens show no overlap. This matter will have to be checked, however, and it is intended to study other radii of this pair. In any case, they provide sample diagrams for considerable portions of the 14th and 15th centuries.

IV

16th Century Beams from Brooke House, Hackney

Two other specimens, DC24 and DC25, contain about a hundred rings. Their external shape and size are similar, and there is one corner of about three centimetres depth eaten up by beetle larvae. It is possible that they came from the same tree. The beams, or beam, from which they were cut, were part of a corner post of Court I of Brooke House, Hackney. They were put into the building in 1535 and represent one or two of 80 oaks from Epping Forest presented by Henry VIII. These specimens, too, were procured with the help of Professor Grimes.

Specimen DC24

DC24 is a most unpromising specimen, as the rings are much interfered with by the presence of internal branches and possibly root buttresses. It was therefore considered advisable to measure a short radius only which lay in the least disturbed area and comprised 72 rings. This radius is composite; it had to be stepped in order to avoid worm holes.

The ring widths are very variable. Narrow sequences lie around year 19 and year 52, and years 8 and 64 are exceptionally broad.

Specimen DC25

DC25, too, is a bad specimen, though it suffers less from internal branches than DC24. The radius measured had to be stepped twice, and the number of rings available is only 59. Narrow rings appear around year 11 and year 48, and years 4 and 59 are exceptionally wide.

The best agreement between DC24 and DC25 is obtained by equating ring 2 of DC24 with ring 1 of DC25. In this case, the agreement coefficient over the total of the 59 rings available on DC25 is 67%, which is significant. Moreover, the series from ring 17 of DC25 (=18 of DC24) to ring 34 of DC25 (=35 of DC24) has an agreement of as much as 83%. This in fact would be higher still if there were not several rings of almost equal width which had to be negelected in the calculation of the percentage. This correlation may be regarded as reliable.

An attempt to correlate DC24 or DC25 with DC22, with the peripheral portion of which they are likely to overlap in time, has however not met with success. Several attempts have been calculated, but no significant result was achieved. Similarly, DC23 did not produce a significant match. In view of the importance of these specimens, it is intended to supplement the material so far obtained by measuring further radii on the specimens.

Summary and Conclusion

This paper is intended to show that dendrochronological work on British oak is fraught with difficulties, which can only be overcome by the measuring of several radii on the same specimen. Above all, it is most important to have more than one specimen from each place, so that the most regular can be selected. The specimens which have so far been available do not completely satisfy this requirement. Several of them are very irregular along the periphery of the rings and badly damaged by insects. Whilst this damage cannot be avoided, it should be possible to cut slabs from the timber where there is least distortion due to branches and root buttresses. When a sufficient number of slabs can be made available from a piece of timber, the most suitable can be selected for measuring and counting. The writer feels that special care in sampling holds out some promise and that it is worth while to continue efforts to establish a correlation sequence back to about the Norman Conquest, and perhaps another one for the Roman period.

One point has emerged clearly, viz. that the much recommended method of core sampling with drills will not yield comparable results in a wood that shows so much variation on different radii in the same plane as British oak does.

It is hoped that the samples from the twelfth to the seventeenth century here presented will provide a basis for ultimate correlation.

In conclusion, I wish to thank Professor W. F. Grimes for his help in obtaining the material and Professor F. E. Zeuner for his guidance and help in overcoming technical problems.

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Schove, D. J., 1954. 'Summer Temperatures and Tree Rings in Northern Scandinavia A.D. 1461-1950.' *Geogr. Ann. Stockholm,* 36: 40-80.

Zeuner, F. E., 1958. *Dating the Past.* 516 pp. 27 pls. London.

Report of the Director for the Session 1958–59

The Institute has now completed its first full session at Gordon Square and the anticipation that this more central position would lead to an increase in activity generally has been satisfyingly fulfilled. The Institute was able during the session to make its contribution to the general problem of lecture-hall accommodation in the University precinct by making the large lecture-hall available at convenient times to a number of University organizations, including the Institute of Classical Studies, the Institute of Slavonic Studies and the Computational Unit; and also provided a meeting place for a selected number of extra-University bodies of academic or learned character.

More important, from the point of view of its own interests, the Institute appears to be making a growing contribution to teaching. As the student figures show, there was a notable increase in the number of Inter-collegiate students, as well as in its own registrations. But the development is not confined to the purely academic side. It can reasonably be claimed that the Institute has become a focal point for a variety of archaeological interests whose needs differ somewhat from those of most societies, particularly in matters of archaeological research. Thus, two research committees of the British Association, set up to study "buried archaeological remains" and "ancient field systems" respectively, meet regularly at the Institute, as also do some of the Committees of the Council for British Archaeology. The United Kingdom Group of the International Institute of Conservators also hold their monthly meetings in the Conservation Department. The contacts resulting from these gatherings and participation in them are of the greatest value to the Institute and its members. It has also been possible to provide the University Archaeological Society with a meeting place in an appropriate setting.

Reference is made below to co-operation with the Extra-Mural Department.

GORDON CHILDE BEQUEST AND MEMORIAL

The Committee of Management of the Institute appointed a Gordon Childe Bequest Sub-Committee to make recommendations both on the application of the income from the Bequest and on the form of the memorial to Professor Childe.

The Committee accepted the recommendation that the income from the Bequest be administered with maximum flexibility and that a sub-Committee meet at the beginning of each session to make recommendations for the use of the income during that year. The sub-Committee was established on a permanent basis with instructions to make its first recommendation at the beginning of the 1959–60 session.

The Committee of Management accepted with gratitude Mrs. M. E. L. Mallowan's generous offer to provide a bronze copy of the plaster head by Miss M. M. Howard to be placed in a public place in the Institute as part of the memorial to Professor Childe. The amount realised from the appeal was less than was hoped and the Committee of Management decided, on the recommendation of the sub-Committee, to devote the income of about £10 to the provision of an annual prize for the best student, the choice to be made by the Academic Board of the Institute.

ADMINISTRATION

Staff

THE Director was appointed to two Ancient Monuments Boards (England and Wales) for the five-year period beginning April 1st, 1959.

Dr. F. R. Hodson was appointed Assistant in the Department of European Prehistory. Dr. Hodson's appointment fills an important gap in the teaching of prehistory: in dealing with the prehistoric European Iron Age he will continue to provide the link between the Prehistoric European Department and the Department of the Archaeology of the Roman Provinces as he did last session as Visiting Lecturer.

Professor Zeuner and Dr. Cornwall attended a round-table conference on scientific methods applied to archaeology organised by the Wenner Gren Foundation at its European headquarters in Austria.

Mr. Frere attended the Congress of Classical Archaeology in Rome in September, 1958, where he read a paper, and, in collaboration with Mr. Cookson, exhibited the Institute's films on Wall Plaster and Mosaic Pavements.

Professor Mallowan was elected to an Honorary Life Fellowship of the Metropolitan Museum, New York, in September, 1958.

Dr. Kenyon attended the Congress of Classical Archaeology in Rome. She was appointed Norton Lecturer of the Archaeological Institute of America and in March and April gave thirty-two lectures in various parts of the United States and Canada.

On the clerical staff Miss M. J. Hurrell was appointed secretary to the Director in place of Miss M. C. Pinsent, who resigned in December 1958. Miss J. O. L. McConnell also resigned her post as general departmental secretary and was succeeded by Miss S. Young.

During the session Messrs. W. Macdonald and A. R. Bone resigned as hall porters; their places were taken by Messrs. E. Biggs and W. Cleghorn.

Lectures and exhibitions

Professor Rodney Young of Pennsylvania University delivered a series of three Special University Lectures at the Institute in the second term, taking as his subject, "Excavations at Gordion in Phrygia." Attendances averaged 65.

In the third term a course of six lectures under the general title of "Animals in Archaeology" was given by members of the staff, with Professor C. M. Robertson of University College and Mr. A. F. Shore of the British Museum covering the Classical world and Ancient Egypt respectively. Attendances at this series averaged 84. The Institute joined with the Institute of Classical Studies in sponsoring a lecture by Mrs. Margaret Guido on "An Underwater Survey of Greek Remains round the Sicilian Coast."

By arrangement with the Britain-China Friendship Association an exhibition of archaeological photographs illustrating recent excavations and discoveries in China was set up in the entrance hall during November 1959. The exhibition was organised by Mr. W. Watson of the British Museum and Mr. W. Willetts. It was opened by the Chinese Chargé d'Affaires, Mr. Huan Hsiang.

During the Christmas vacation the Council for British Archaeology organised a well-attended conference on Iron Age at the Institute, which will in due course publish the valuable series of papers that resulted from the meeting. The Prehistoric Society also held its accustomed Easter conference, the subject of which was "Hill Forts."

As in the past, the Institute staff continued to co-operate with the Extra-Mural Department. The Director continued to act as External Examiner. Professor Zeuner, Dr. Waechter and Miss Sheldon in the Environmental Department and Mr. Frere in the Roman Department undertook lecture-courses, some of which were given at the Institute itself, where students could benefit from the ready availability of teaching material.

Students

The total number of students registered at the Institute during the Session was 87; besides these, 54 Inter-collegiate students attended courses. Of those registered at the Institute, 19 were registered for Diplomas, 21 for Higher Degrees, 3 for special research under Statute 21 (iii) part-time, and 11 as full-time Technical students; 29 Occasional students have been attending lectures and using the facilities of the Institute and 4 students have attended Diploma courses as full-time Occasional students.

One student was awarded the Diploma in European Archaeology, Section B.1, one student the Diploma in Indian Archaeology, one the Diploma in Archaeology of Western Asia and one the Diploma in Prehistoric Archaeology.

Of the 21 students registered for Higher Degrees, 4 were registered for the Ph.D. full-time and 4 part-time, 7 for the M.A. full-time and 5 part-time, and one for the

M.Sc. full-time. Of the foregoing, one student was awarded a Ph.D. Degree and one an M.A. Degree. The Ph.D. Degree was awarded to Mr. D. E. Vaughan, with a grant from the D.S.I.R., for his thesis on "The influence of geological history and sample preparation on radio-carbon dating, with comments on the method itself"; the M.A. degree was awarded to Mrs. J. M. Birmingham for her thesis on "The Archaeology of Cyprus from 1200–600 B.C., with special reference to foreign connections."

Eight full-time Technical students qualified for the Institute's internal certificate for Conservation and Technology.

The following overseas countries were represented among students registered at the Institute: Canada 1, Ceylon 1, Cyprus 1, Ghana 1, Greece 1, Iraq 1, Malta 1, Nigeria 1, Pakistan 1, Portugal 1, South Africa 1, Spain 2, Sweden 1, Thailand 1, Uganda 2 and U.S.A. 5.

Collections

A collection of flint implements, mainly from southern England and ranging in time from the Palaeolithic to the Bronze Age, was presented by Mr. R. H. M. Clayton.

Professor Evans gave some Late Bronze Age sherds from the Lipari Islands and a series of Neolithic sherds from Crete.

The Ipswich Museum deposited in the Institute a quantity of stone implements from local sites which fill important gaps in the Institute's teaching collections.

M. Stekelis of the Hebrew University in Israel presented a series of Mesolithic and Neolithic flint artefacts from Nahal Oren.

TEACHING AND RESEARCH

Institute Field Course

IN the past it has been left to students to obtain field experience through their own efforts by attendance at excavations of their own choice. Many have assisted at excavations directed by teachers of the Institute; in addition there have been special departmental investigations, conducted particularly by the Environmental Department. In June the Institute's own field course was inaugurated. The field course is not intended to replace experience gained elsewhere; nor is it a substitute for departmental needs. Its aim is to provide students with a wider introduction to field archaeology and with more opportunities of applying techniques learned in lecture-rooms and laboratory, than is possible on most excavations.

Through the kindness of the Drucella Farm Company the course was centred upon Druids Lodge, near Amesbury, Wilts, and thanks are due to the Directors of the Company, Messrs. Felix Fenston and R. Turpin, for lending accommodation and providing many other facilities. The central feature of the work was the excavation of several members of the Lake group of barrows; the excavation was carried out on

behalf of the Ancient Monuments Department of the Ministry of Works, which made a grant towards the cost and provided equipment.

An average of 26 students per week attended the course, which was directed by the Director and Professor Evans. The administration was in the hands of the Secretary, who was present throughout, as also were Mr. Cookson and Mr. Stewart to deal with photography and surveying respectively. Mr. Hodges and Dr. Waechter were present for shorter periods and Dr. Cornwall (who talked on soils) and other members of the Institute also visited. In addition to the excavation students took part in a number of field-excursions. The report on the excavation (which produced a useful series of Bronze Age urns, in spite of the fact that the barrows had been previously disturbed) will appear in due course in the *Bulletin*. In the meantime, this first undertaking has given valuable experience for future courses and it is intended as far as possible to make it compulsory for all students.

The Director continued to direct the operations of the Roman and Mediaeval London Excavation Council, which were centred mainly on the north-western areas of the City. He acted as consultant to the Corporation of London Engineer in the conservation of the City wall and its related features and to private owners in the preservation of a part of the London Charterhouse. He also directed the conservation and restoration of Pentre-ifan chambered tomb, Pembrokeshire, for H.M. Ministry of Works. He lectured extensively in London and elsewhere.

ENVIRONMENTAL ARCHAEOLOGY

The number of students working in the Department during the year was 17, 5 being registered for Ph.D., 4 for the M.A., 1 for the M.Sc., 3 as Research students under Statute 21(iii), and 4 for the Postgraduate Diploma in Prehistoric Archaeology. Of the Higher Degree students, 4 were registered in the Faculty of Science and 6 in the Faculty of Arts. The following is a list of the subjects on which these students worked during the session:—

Ph.D.

R. W. Andrews (Faculty of Science (*part-time*)): British varved clays.
J. Clutton-Brock, Miss (Faculty of Science): Faunas from prehistoric sites.
G. W. P. Jarvis (Faculty of Arts (*part-time*)): Sites in the Lea Valley.
J. Philips, Miss (Faculty of Arts (*part-time*)): Indian Lower Palaeolithic.
D. Vaughan (Faculty of Science): Radiocarbon dating.

M.A.

D. Abbott (Faculty of Arts): Magdalenian.
E. Coult, Mrs. (Faculty of Arts (*part-time*)): North African Stone Age.
S. Pearce, Miss (Faculty of Arts): Iron in prehistoric Africa.
G. J. Wainwright (Faculty of Arts): Mesolithic of South-west Britain.

M.Sc.

A. Rosenfeld, Miss (Faculty of Science): Archaeological deposits of Torbryan Caves, Devon.

Statute 21(*iii*)

A. Grosvenor-Ellis, Miss: Fauna of Neolithic sites, including Jericho.

P. Wallace, Miss (*part-time*): Dendrochronology.

A. C. Western, Miss (*part-time*): Identification of wood from archaeological deposits.

Of the research students, Mr. D. Vaughan presented his thesis at the beginning of the session and was awarded a Ph.D. Miss A. Fitzgerald was successful at the Diploma examination in June 1959.

In addition to the normal courses within the Department, six students attended a course on soil analysis methods in the laboratory given by Dr. Cornwall, and Dr. Waechter gave a special course on the Palaeolithic and Mesolithic for six students studying Anthropology for their First Degree.

Research was carried out by Professor Zeuner on the prehistory of the Canary Islands, which is being done in collaboration with several Spanish institutions. He also worked on the fauna of prehistoric Jericho and completed a joint report with Dr. Sutcliffe on the excavations at Tornewton Cave, Torbryan, Devon.

Excavations were continued at Three Holes Cave, Torbryan, Devon, where bedrock was reached in most places. More material for investigation was collected and is in the hands of Miss Rosenfeld.

Dr. Waechter visited Palaeolithic sites in Lebanon, Jordan and Cyprus and continued his work on the Upper Palaeolithic sequence at Ksar 'Akil. He also worked on the stone implements from Jericho and completed the archaeological report on a Palaeolithic site at Palmyra for the Philadelphia Museum. He continued his investigations of problems connected with Lower Palaeolithic sequence in the Middle Thames.

Miss Clutton-Brock has been investigating animal bones obtained from Mr. Sinclair Hood's excavation of a Bronze Age site at Chios.

Apart from sites studied specifically in the interests of teaching and research, six requests to study soils, the nature of archaeological material and bones were dealt with by Dr. Cornwall during the year, involving over 120 specimens. They came from the following sites: Sutton, Co. Dublin (Mesolithic/Neolithic), Thornborough Cursus Ditch (Neolithic); Lanhill Long Barrow (Neolithic); Codford Lamb Down, Wilts (Bronze Age); Druid's Circle, Penmaenmawr (Middle Bronze Age); and Stoke Gabriel, Devon (Iron Age).

Publications

By Professor Zeuner:
"Animal Remains from Myrtou-Pigadhes, Cyprus." In J. du Plat Taylor, *Myrtou-Pigadhes*, pp. 97–100 (Oxford).
"A new Liassic Dragonfly from Gloucestershire." *Palaeontology*, I, pp. 406–7.
"Jurassic Beetles from Grahamland, Antarctica." *Palaeontology*, I, pp. 407–9.
"Replacement of Neanderthal Man by *Homo sapiens*." *Neanderthal Centenary Volume* (1958), pp. 312–15.
"Lineas Costeras del Pleistocene en las Islas Canarias." *An. Est. Atlanticos*, No. 4 (1958), pp. 9–16.
The Pleistocene Period. Second edn., pp. 447 (London).

By Dr. Cornwall:
"The Animal Bones." Appendix III in M. A. Cotton and P. W. Gathercole, *Excavations at Clausentum, Southampton* 1951–1954 (London), pp. 141–2.
"Animal Bones from the Earlier Periods" and "Soil Samples." In J. du Plat Taylor, *Myrtou-Pigadhes*, pp. 100–101 and 101–2.
Soils for the Archaeologist, pp. 230 (London).

INDIAN ARCHAEOLOGY

One student, Mr. A. H. Mirza, was registered for the Diploma. Mr. Mirza obtained his Diploma in June. Students from the School of Oriental and African Studies have attended courses and with students from other schools of the University have been given instruction from time to time on research projects.

Visits to the national museums have been well attended throughout the session. Expeditions have been carried out to the museums at Oxford and Cambridge, to Sturry and Canterbury, Verulamium and St. Albans. Visits were also made to the Trundle and Chichester, Cissbury and Old and New Shoreham, as well as the mediaeval monuments of London, including the Tower and Westminster Hall. There is sufficient demand for these expeditions for a more extended programme, but transport is a major difficulty.

PREHISTORIC EUROPEAN ARCHAEOLOGY

There were 4 students registered full-time for the Postgraduate Diploma, 3 of these being in their first year, and 1 in the second year.

Four students were registered for higher degrees, as follows:—

Ph.D.

D. Britton (Faculty of Arts): Some aspects of the metal industry in Prehistoric Europe, especially in Britain.

R. R. Mackay (Faculty of Arts (*part-time*)): Beaker domestic sites in Britain with special reference to East Anglia.
S. Mann, Miss (Faculty of Arts (*part-time*)): Neolithic pottery in Italy and Greece.

M.A.

P. C. Ozanne (Faculty of Arts): The Iron Age in Western Britain.

Mr. Britton, having completed his two years statutory residence, was appointed Assistant to the Professor of Prehistoric Archaeology at Oxford.

Teaching was also provided for 3 Occasional and 7 Inter-collegiate students.

During the Easter Vacation Professor Evans and 3 students attended a ten-day course in the Lipari Islands and Sicily on the prehistoric archaeology of the region. This course was organised by Professor L. Bernabo Brea, with financial backing from the Sicilian Tourist Organisation. Students and teachers from the Universities of Cambridge, Edinburgh, Oxford and Belfast were also present.

Publications

By Professor Evans:
Malta. 255 pp. (London: Thames and Hudson, Ancient Peoples and Places Series, No. 11.)
Various reviews.

ARCHAEOLOGY OF THE ROMAN PROVINCES

Within the Department 1 student has been working for a Ph.D. degree, and for the M.A. there have been 2 whole-time and 2 part-time candidates. One student is registered under Statute 21(iii). One full-time and 1 occasional student have completed the Diploma course, and there has been 1 first-year diploma student. Sixteen inter-collegiate students attended the course on Roman Britain.

Ph.D.

M. Rennie, Miss (Faculty of Arts): Roman pottery of the Severn basin.

M.A.

J. Alcock, Miss (Faculty of Arts (*part-time*)): Romano-British religion.
M. Brennand, Miss (Faculty of Arts): Mosaic pavements in Britain.
H. F. Cleere (Faculty of Arts (*part-time*)): Romano-British iron.
A. Birchall, Miss (Faculty of Arts): The Belgae.

Statute 21(iii)

A. Brocklebank, Miss: Romano-British objects of manufacture and trade.

Work on the Canterbury pottery has been continued by Miss M. G. Wilson, and on the Verulamium wall-plaster by Mr. and Mrs. H. J. M. Petty and Mrs. Hope

Simpson. Miss Brocklebank has continued work on the card-index of Romano-British finds.

In April, Mr. Frere spent a fortnight examining and surveying new Roman sites in central and southern Wales with Dr. J. K. St. Joseph.

He continued to direct excavations at the Roman villa at Bignor and at Verulamium. In July an expedition led by Mr. Frere and Mrs. Brogan excavated an Iron Age hill fort in the Corréze, France, and carried out a survey of Iron Age earthworks in the region. A number of students took part in these investigations.

In addition to a number of public lectures Mr. Frere has also conducted extra-mural courses at Gravesend, Chipstead and at the Institute.

Publications

By Mr. Frere:
"Excavations at Verulamium 1958: 4th Interim Report." *Antiquaries Journal*, XXXIX (1959), pp. 1–18.
"The Iron Age in Southern Britain." *Antiquity*, XXXIII (1959), pp. 183–8.
Editor, *Surrey Archaeological Collections*, Vol. LVI. Various reviews.

WESTERN ASIATIC ARCHAEOLOGY

Within the Department there was 1 student registered for the Diploma in Western Asiatic Archaeology (Mesopotamia), and 4 students for the Diploma in Western Asiatic Archaeology (Palestine). Of these, Mrs. F. James passed the Diploma examination in June 1959. There was 1 occasional student (Mesopotamia); 1 student was registered for the M.A. degree as follows:

J. Birmingham, Mrs. (Faculty of Arts): Archaeology of Cyprus from 1200–600 B.C.

Mrs. Birmingham presented her thesis and was awarded the M.A. degree.

A class of 18 students attended the special course in Anatolian Archaeology and 20 attended the course on the Foundations of Civilisation in Western Asia.

Sixteen students attended the course in Palestinian Archaeology.

The Department continued its research activities. Professor Mallowan visited Baghdad in January–February 1959 in order to direct the activities of the British School of Archaeology in Iraq and worked in the Iraq Antiquities Department collating material for the completion of his book on the excavations at Nimrud.

Dr. Kenyon visited Jerusalem for a month at Christmas in connection with the excavations of the British School of Archaeology in Jerusalem at Petra and Jericho. Mrs. Maxwell Hyslop visited Copenhagen to see the Asiatic collections in the National Museum and to meet Danish colleagues.

In the summer of 1958 Professor Mallowan was invited to lecture on one of the

Hellenic cruises and gave a series of talks on the oriental background of the ancient Greeks. Dr. Kenyon gave a number of lectures, mainly on Jericho, in various parts of England.

Publications

By Professor Mallowan:

Editor, *Iraq*, Vol. XXI (1959).
Twenty-five Years of Mesopotamian Discovery, revised edition (1959), pp. vi + 81.
Various articles and reviews.

By Dr. Kenyon:

Excavations in Southwark (Research Report of the Surrey Archaeological Society No. 5, 1959), pp. 112.
"Some observations on the beginnings of Settlement in the Near East." *Journal of the Royal Anthropological Institute*, 1959, pp. 35–43.
"Earliest Jericho." *Antiquity*, XXXIII (1959), pp. 5–9.
Contributions to *The New Peake Commentaries*, 1959.

DRAWING AND SURVEYING DEPARTMENT

Of the students attending the Drawing course, 10 were Diploma and Higher Degree students, 9 were from the Technical Department and 1 was an Inter-collegiate student. Two Occasional students and 10 Diploma and Higher Degree students attended the Surveying course.

Facilities for the instruction of students in surveying were greatly improved by the institution of the field training course in archaeology. The plans and records of the parties working on the barrows were verified, and will be used in the eventual publication.

In drawing the usual services were provided to members of the staff both for departmental work and for their research publications.

PHOTOGRAPHIC DEPARTMENT

In the first full session in the new studio teaching made heavier demands than in previous years. After the preliminary lectures, classes were divided into smaller units to enable the lecturer to give more individual attention to students. The results were seen in the quality of the work produced; the annual test work was marked by an outside authority, who was agreeably impressed by it.

Visits were paid to the London School of Graphic Arts and to Kodak Ltd.

The Department has continued to make its contribution to archaeological research and teaching. The lecturer was given leave of absence once again to undertake the

photography for the Verulamium excavations and during the Easter Vacation provided the Roman Provinces Department with a number of new photographs for teaching purposes. A copy of the Institute's film, "The Lifting and Conservation of Wall-Plaster," was supplied to the Colt Archaeological Foundation, New York. A small film on the excavation of timber buildings was completed. In addition to increased projection-work for Institute lectures, the Head of the Department gave a number of lectures to W.E.A. and Extra-Mural courses.

The following additional equipment was purchased for student use:—

(1) Two Periflux enlargers fitted with Ross Resolux lenses.

(2) Another small field camera and tripod.

Thanks are due also to Dr. Winifred Lamb for the gift of a Ross whole-plate camera with lens and dark-slides, the whole in a hide leather carrying case.

A contribution of £100 was made by I.C.I. in return for a copy of the Wall-Plaster and Mosaic Pavements films. It is intended to put this sum towards the purchasing-price of much-needed sound-ciné apparatus.

The studio continues to attract interest and was inspected by some 30 visitors during the session.

CONSERVATION DEPARTMENT

Thirty-two students worked in the Department, of whom 15 were full-time students following the Conservation course, 12 Diploma and Higher Degree students, and 1 an Occasional student. Special courses of instruction were given to Mrs. Eve Stewart of Sydney University, Miss Kathleen Salmon of the Ashmolean Museum, Miss Janet Rhodes of the Department of Anthropology at University College, London, and Mr. George Boone of the National Museum of Wales.

Work was carried out for the museums at Alton (Curtis), Aylesbury, Hove, Lewes, Lincoln, Plymouth, Winchester and the Department of Egyptology, University College, London, and for the Verulamium and Nimrud excavations. As in the past, everything undertaken had a direct instructional value for the students.

Second-year students, in addition to their normal conservation work, gained experience in casting, using both traditional methods and a wide range of newly developed casting media and materials. They also gained experience in electro-typing small objects.

A certain amount of work on water-logged wood and leather using carbowax was carried out with most promising results.

A model of the village of Skara Brae, designed to fit into the Institute's standard storage cupboards, was also made by senior students for the Prehistoric Department.

Miss Mavis Wood spent the last term of her second year as Museum Assistant to

Mr. Cottrill at Winchester Museum and Miss Hannah Williams was lent to the British Museum Research Laboratory for most of her last term, where besides gaining valuable experience she was able to be of some help.

Thanks are again due to Mr. S. Rees-Jones of the Courtauld Institute and to Mr. Rixon of the British Museum (Natural History) for their kindness in instructing the students in the work of their departments.

The Department played its part in the work of the United Kingdom Group of the International Institute of Conservation. Miss Gedye is secretary of the Group and both she and Mr. Hodges abstract for the Institute. Mr. Hodges lectured on Conservations in the Museums Association Diploma course at Leicester.

Publications

By Mr. Hodges:

Various notes and reviews.

THE LIBRARY

The first full session of the Institute's residence in the University quarter has been reflected in the very full use of the Library. Readers averaged eight to ten daily during the term and the number of books borrowed has gone up by one half. The lantern slides were again extensively used by Extra-Mural lecturers.

The staff, in addition to much increased help to readers and borrowers, was principally occupied in consolidating the catalogues and accessions as a result of the move. Some progress has also been made with the help of students in organising the photograph files.

The following is a summary of additions made during the year:—

Books		295	*Pamphlets*		172
purchased	124		purchased	15	
presented	82		presented	126	
exchanged	89		exchanged	31	
Periodicals		420	*Lantern slides*		1,801

279 volumes were bound.

Volumes lent totalled 4,123, the highest month being November (539), the lowest August (81). 63 works were borrowed from outside libraries and 24 lent. 5,291 lantern slides were lent.

The following have presented books, periodicals, pamphlets and slides:

Y. Aharoni; G. N. Aitken; Dr. B. Allchin; Dr. F. R. Allchin; Mrs. R. B. K. Amiran; E. Anati; Society of Antiquaries of London; A. ApSimon; P. Ashbee; the *Banbury Guardian*; Bedford College; Ernest Benn Ltd.; Dr. Gerhard Bersu; Bogotá, Museo deo

Oro del Banco de la Republica; Abbé H. Breuil; British Archaeological Association; British Museum; British School of Archaeology in Jerusalem; Caracas, Comisión Indigenista; CIBA Review; Dr. J. Desmond Clark; Professor K. de B. Codrington; D. D. Colt; Dr. I. W. Cornwall; Mrs. Cotton; The Courtauld Institute; J. D. Cowen; Dr. J. W. Crowfoot; Per Fett; Dr. H. Field; S. S. Frere; Miss I. Gedye; T. Gee; Dr. P. R. Giot; Dr. H. Godwin; Goldsmiths' Librarian, University of London; Col. D. H. Gordon; Professor W. F. Grimes; Dr. E. T. Hall; Dr. D. B. Harden; Dr. H. Helbaek; H. W. M. Hodges; Institute of Classical Studies; Institute of Historical Research; Institut Royal du Patrimoine artistique, Brussels; Inyanga Research Fund; Instanbul, Topkapi Saray Müzesi; Dr. K. M. Kenyon; Dr. F. A. Khan; A. D. Lacaille; Dr. J. L. Lorenzo; F. D. McCarthy; Professor M. E. L. Mallowan; T. G. Manby; J. V. S. Megaw; Meiji University; Dr. M. A. Murray; Dr. R. North; Olomouc, Historicky Ustav; J. Perez de Barradas; Pharmaceutical Society of Great Britain; E. Pyddoke; Executors of Viscountess Rhondda; Royal Institute of International Affairs; Dr. W. A. M. Smart; Dr. I. F. Smith; J. R. Stewart; Dr. B. Subbarao; Professor T. Sulimirski; E. M. Swanson; Miss G. C. Talbot; Miss J. du Plat Taylor; A. C. Thomas; Dr. J. Waechter; F. T. Wainwright; Executors of Hazzledine Warren; Miss A. C. Western.

Report of the Director for the Session 1959-60

INTRODUCTION

Activities during the session 1959-60 have followed the pattern developed during the early terms at Gordon Square. Full use continues to be made of the Institute as a meeting-place for a wide variety of archaeological organisations as set out in the last Report.

Saturation-point seems in fact to have been reached, at any rate within the present framework of opening-hours; and for this reason several bodies who wished to use the Institute's facilities have had regretfully to be turned away.

Members of the University Grants Committee visited the Institute on January 27th. They inspected the building and talked with representatives of the staff, students and Committee of Management. Proposals for the coming Quinquennium are intended to consolidate or develop the existing pattern of teaching within the Institute, but some of the proposals put forward by the Board of Studies in Archaeology, if accepted, must also involve the Institute.

GORDON CHILDE MEMORIAL AND PRIZE

The bronze head of Professor Childe by Miss M. M. Howard, the gift of Mrs. M. E. L. Mallowan, was placed in the Library, where it occupies a prominent position near the entrance to the reading-room.

The Prize was awarded to Mr. Ekpo Eyo as the best student of the year. Mr. Eyo, having previously taken the conservation course with outstanding success, was allowed to proceed to the course for the Post-Graduate Diploma in Prehistoric Archaeology. He achieved Distinction in the examination for this Diploma in June. At the same time he fulfilled the requirements for admission to Pembroke College, Cambridge, with the intention of reading Anthropology and Archaeology.

GORDON CHILDE FUND

The first grant from the Gordon Childe Fund was made to Mr. David Stronach of Cambridge for work on the prehistoric site of Yarim Tepe, Iran.

ADMINISTRATION

Director: Professor W. F. Grimes, C.B.E., M.A., F.S.A., F.M.A.
Secretary and Registrar: E. Pyddoke, F.S.A.
Director's Secretary: Miss M. J. Hurrell, B.A.
Senior Clerks: Mrs. P. Brooks (to April, 1960)
Miss M. F. Varese (from April, 1960)
Miss S. Young (to November, 1959)
Mrs. M. Hunt (from January, 1960)
Clerks: Miss G. Kemp
Miss M. Coggan (April - May, 1960)
Miss J. A. Charlesworth (from May, 1960)

Staff matters

The Director was appointed Chairman of the British Association Research Committee on Ancient Fields.

Mr. Pyddoke was elected a Fellow of the Society of Antiquaries of London.

Professor Zeuner was elected a Vice-President of the Prehistoric Society.

Dr. Waechter was granted the status of Recognised Teacher in the University in June.

Dr. F. R. Hodson took up his appointment as Lecturer in the Department of Prehistoric European Archaeology at the beginning of the Session.

Mr. Frere represented the Institute at the official opening of the Museum of Antiquities at King's College, Newcastle-upon-Tyne (University of Durham) in May.

Professor Mallowan was appointed C.B.E. in the Birthday Honours List. He visited Pakistan at the invitation of the Pakistan Government, to inspect sites and lecture at the Universities of Lahore and Peshawar. He also visited Iran to arrange for an excavation permit and discuss a project for a British Institute of Archaeology in Iran.

Mr. Hodges was elected a Fellow of the International Institute of Conservation.

Miss M. M. Howard, who had been artist (part-time) to the Institute for twelve years, retired at the end of the session. Miss Howard had amongst other things been responsible, under Professor Zeuner's direction, for the production of the Institute's remarkable series of models illustrating past environmental conditions in Europe.

Public Lectures and Exhibitions

A total of 22 public lectures was given during the session.

Professor J. Papadimitriou, Director of Antiquities, Athens, delivered two

Special University Lectures in the summer term, his subjects being 'The Bronze Statues of Piraeus' and 'The Sanctuary of Brauronian Artemis and the Tomb of Iphigeneia in Attica'. Attendances averaged 90.

In the spring and summer terms a course of lectures on recent work in British archaeology attracted an average attendance of 62. Subjects ranged from the Mesolithic to the Medieval period; the lecturers were Messrs. J. Wymer (Reading Museum), I. Stead (Cambridge), Graham Webster (Birmingham University), Paul Ashbee, J. Wacher (Ministry of Works), W. E. Griffiths (Royal Commission on Ancient Monuments (Wales and Monmouthshire)), J. H. Hurst (Ministry of Works), Mrs. S. J. Hallam (Loughborough) and Dr. Seton Williams.

As in the past, advantage was taken of the presence of distinguished archaeologists in London to arrange lectures, often at short notice. Dr. Marija Gimbutas, of the Peabody Museum, Harvard University, lectured on 'The Neolithic-Chalcolithic Kurgan Culture north and east of the Black Sea and the problem of its westward expansion'; Dr. H. O'N. Hencken, also of Harvard University, on 'The origin of the Etruscans'; Professor K. Jazdzewski of the University of Lodz, Poland on 'The Funnel-neck Beaker Culture in Poland and its possible origin' and 'The Context in Prehistory of the Kujavian Graves' in the autumn term. In the spring term Mr. James Mellaart, Assistant Director of the British School of Archaeology at Ankara, lectured on 'Excavations at Hacilar, 1958-9'; Professor L. Pericot of Barcelona University on 'Prehistoric Cave- and Rock-paintings in Spain'; Professor G. Bersu of Frankfurt on his excavations of a Viking site at Balladoole in the Isle of Man; and M. Jean Perrot, Director of the French Archaeological Mission in Israel, on 'Eight Seasons' Excavations at Beersheba'. Attendances at these lectures averaged 65.

In connexion with Professor Pericot's lecture an exhibition of original drawings and prints by Dr. E. Ripoll, augmented by material from the Institute's teaching collections, was arranged in the vestibule. In the autumn term Miss Olga Tufnell kindly arranged a comparative exhibition of ancient and modern Arab potters' wares and techniques under the title 'So doth the potter . . .' to which she also lectured. Selected examples of the modern pottery were added to the Institute's permanent teaching collection.

The Prehistoric Society held its accustomed Easter conference at the Institute, the subject of which was 'The Mesolithic Period'. Professor Zeuner, Dr. Waechter and Mr. G. J. Wainwright, an Institute research-student, read papers and Dr. Waechter organised an exhibition of loan material from various British sites.

As in the past, the Institute co-operated with the Extra-Mural Department in teaching for the University Extension Diploma in Archaeology and Mr. Frere, Miss Sheldon, Mrs. Christie and Dr. Seton Williams (former students) undertook lecture-courses. The Director again acted as External Examiner. With the first

four-year course in the Diploma completed several fifth-year groups to undertake practical work on material from archaeological sites were established and it was found possible to provide them with accommodation on a system of rotation.

At the request of the British Council a course on 'The Conservation of Antiquities' was centred upon the Institute in the early part of July. The course was directed by Dr. A. E. Werner of the British Museum and the Lecturers in Conservation took an active part in it. They, the Lecturer in Photography and Dr. Cornwall gave lectures. The course was attended by 21 members from 15 countries. Its success was such that the British Council intend to organise a second course on similar lines in 1963.

Students

The total number of students registered at the Institute during the Session was 83; besides these 60 Intercollegiate students attended courses. Of those registered at the Institute 18 were registered for Diplomas, 32 for Higher Degrees, 4 for special research under Statute 21 (iii) part-time, and 11 as full-time Technical students; 15 Occasional students have been attending lectures and using the facilities of the Institute and 3 students have attended Diploma courses as full-time Occasional students.

Two students were awarded the Diploma in European Archaeology, one in Section A (Prehistoric Europe) and one in Section B (Roman Provinces); two students were awarded the Diploma in Western Asiatic Archaeology, one in Section A (Mesopotamia) and one in Section B (Palestine); and two the Diploma in Prehistoric Archaeology (one with distinction).

Of the 32 students registered for Higher Degrees, 9 were registered for the Ph.D. full-time and 5 part-time, 10 for the M.A. full-time and 7 part-time, and one for the M.Sc. full-time. Of the foregoing, one student, Miss Susannah Pearce, was awarded the M.A. degree for her thesis on 'The Appearance of Iron and its use in Protohistoric Africa'.

Three full-time Conservation students qualified for the Institute's internal certificate for Conservation and Technology.

The following overseas countries were represented among students registered at the Institute: Greece, 3; U.S.A., 3; Pakistan, 2; Israel, 2; one each from Australia, Nigeria, Thailand, South Africa, Canada, Ceylon, Jordan, India, Iraq, Mexico, Ghana, Lybia, Lebanon, Sweden.

Teaching Collections

The following were the most important additions:—

Collection of Kulli and Shahi-tump potsherds, given by the Director General of Archaeology in India.

Series of modern Arab pots illustrating primitive pottery technology, given by Miss Olga Tufnell.

Selection of casts illustrating the prehistory of Czechoslovakia, given by Akademik J. Böhm, Prague.

Selection of material from Vinča, Yugoslavia, on permanent loan from the Birmingham City Museum and Art Gallery.

Collection of bronzes and pottery from northern Persia, given by Mrs. I. Ainley.

Collections of potsherds from Beycesultan, given by the British Institute of Archaeology at Ankara.

Series of stone implements from Shukbah, Palestine, given by Dr. J. Waechter.

The thanks of the Institute are due to the donors named and to Mr. J. D. Cowen, Mr. Nicholas Thomas and Miss Beatrice de Cardi for their good offices in connexion with the Czechoslovak, Vinča and Indian material respectively.

In addition to the above, the Institute received from M. Fatyanov of the National Museum, Irkutsk, U.S.S.R., a short film illustrating Siberian rock drawings and their treatment. This gift came by way of the British Council.

Other gifts

Mr. R. E. Blaize presented a microphone amplifier and loud-speaker for use in the lecture-theatre—very welcome additions to the Institute's equipment.

TEACHING AND RESEARCH

Institute Field Course

The field course was again centred upon Druid's Lodge near Amesbury, Wilts. and thanks are due to Messrs. Felix Fenston and R. Turpin for their kindness in lending accommodation and for help in other ways. The Ancient Monuments Department of the Ministry of Works also lent equipment to augment the as-yet limited material in the Institute's ownership. The excavation exercise this year was carried out on an enigmatic earthwork known as South Kite, on Stapleford Down. Several areas within the earthwork were cleared, but conclusive evidence as to the date of the site was not forthcoming. Exercises in field-work and interpretation were undertaken at Yarnbury Castle and Winterbourne Stoke Down and included some surveying and photography of earthworks.

An average of 27 students per week attended the three-week course, which was directed by the Director and Professor Evans with the help of Dr. Hodson. The Secretary again was responsible for the administration. Mr. Cookson and Mr. Stewart dealt with the photography and surveying respectively and Dr. Waechter, Dr. Cornwall and Dr. Sulimirski visited for shorter periods, as did

other members of the staff of the Institute. Dr. Cornwall gave two demonstrations on soils.

THE DEPARTMENTS

The Director repeated his general introductory course on archaeology. The course has been made obligatory for internal students of the Institute. It was attended by 27 Intercollegiate students. He continued to direct the excavations in the City of London and made a second tour of French archaeological collections in connexion with his study of continental beaker cultures.

Publications:

Excavations on Defence Sites, 1939-1945: *I. Mainly Neolithic - Bronze Age*. 259 *pp.*

Survey of London: *Parish of Hackney, I*: *Brooke House*. 90 pp. (With W. A. Eden, Marie P. G. Draper and Audrey Williams).

'Later Prehistory and the Coming of the Celts' in *Wales through the Ages*, I (ed. A. J. Roderick), pp. 18-25.

ENVIRONMENTAL ARCHAEOLOGY

Professor: F. E. Zeuner, Ph.D., D.Sc., F.S.A.
Lecturer: I. A. Cornwall, Ph.D.
Lecturer in Palaeolithic Archaeology: J. d'A. Waechter, Ph.D., F.S.A.
Assistant: Miss J. M. Sheldon.
Honorary Assistant: Mrs. R. Barton.

The number of students working in the Department during the year was 17, 6 being registered for Ph.D., 3 for M.A., 4 as Research students under Statute 21 (iii) and 4 for the Postgraduate Diploma in Prehistoric Archaeology. Of the Higher Degree students, 3 were registered in the Faculty of Science and 6 in the Faculty of Arts. The following is a list of subjects on which these students worked during the session:—

Ph.D.

R. W. Andrews (Faculty of Science (*part-time*)): British varved clays.
J. Clutton-Brock (Mrs. Jewell) (Faculty of Science): Faunas from prehistoric sites.
G. W. Jarvis (Faculty of Arts (*part-time*)): Sites in the Lea Valley.
J. Philips, Miss (Faculty of Arts (*part-time*)): Indian Lower Palaeolithic.
A. Rosenfeld, Miss (Faculty of Science): Archaeological deposits of Torbryan Caves, Devon.
G. W. Wainwright (Faculty of Arts): Mesolithic of Western Britain.

M.A.

D. Abbott (Faculty of Arts): Magdalenian.

A. Fitzgerald (Mrs. Eastham) (Faculty of Arts (*part-time*)): Terraces of the Lower Thames.

S. Pearce, Miss (Faculty of Arts): Iron in protohistoric Africa.

Statute 21 (*iii*)

A. Grosvenor-Ellis, Miss (*part-time*): Fauna of Neolithic Jericho.

P. Wallace, Miss (*part-time*): Dendrochronology.

A. C. Western, Miss (*part-time*): Identification of wood from archaeological deposits.

B. Westley, Mrs. (*part-time*): Fauna of Bronze Age Jericho.

Of the Higher Degree students, Miss Pearce presented her thesis entitled 'The appearance of iron and its use in protohistoric Africa' and was awarded the degree of Master of Arts. Miss Collins and Mr. Eyo were successful at the Diploma examinations in June 1960. Mr. Eyo obtained a Distinction and received the Childe Memorial Prize for the best student of the year.

In addition to the normal courses seven students attended a course on soil analysis methods in the laboratory given by Dr. Cornwall, and Dr. Waechter gave a special course on the Palaeolithic and Mesolithic for five students studying Anthropology for their First Degree.

Research was continued by Professor Zeuner on the prehistory of the Canary Islands, which is being done in collaboration with the Museo Canario of Las Palmas, the Spanish Research Council and the Governor of the Province of Las Palmas. He also continued, jointly with Dr. Sutcliffe, the study of the Palaeolithic fauna of Gorham's Cave, Gibraltar. Excavations were continued, in conjunction with Miss Rosenfeld, at Three Holes Cave, Torbryan, Devon.

Dr. Cornwall was asked by the British Association to serve on a Committee to investigate the denudation and burial of archaeological structures and took an active part in the preparation of the site for the experiment.

Dr. Waechter continued work on the Upper Palaeolithic sequence at Ksar 'Akil and began a survey of the important river terrace sites of Taplow and Yiewsley.

Messrs. G. H. Bunting and D. W. Verity worked in the Department under Dr. Cornwall on human and animal bones, in particular on a number of human burials and the identification of animal bones from the site of Balladoole on the Isle of Man.

Apart from sites studied specifically in the interests of teaching and research, seven requests to study soils, the nature of archaeological material and identification

of bones, were dealt with during the year by Dr. Cornwall, involving over 150 specimens. They came from the following sites: Parwich Moor, Derbyshire (Bronze Age); Woking, Surrey (Bronze Age), Hod Hill, Dorset (Iron Age), Bury Wood, Wilts. (Iron Age); a Wessex Barrow (Bronze Age); and the Canary Islands.

Publications

By Professor Zeuner:

El Periodo Pleistoceno. Spanish edn., 399 pp. (Madrid) (1959).

'Notes on Qumrân'. *Palestine Expl. Quart.,* Jan.-June (1960), pp. 27-36.

'Prehistoric Idols from Gran Canaria'. *Man,* 60 (1960), pp. 33-36.

'Some Domesticated Animals from the Prehistoric Site of Guayadeque, Gran Canaria'. *Rev. Mus. Canario,* Nos. 65-72 (1958-59), pp. 31-40.

INDIAN ARCHAEOLOGY

Professor: K. de B. Codrington, M.A., F.R.A.I.

One student, A. H. Mirza, who took the Diploma in Indian Archaeology in 1959 was admitted as candidate for the Ph.D., his thesis title being 'Arts and crafts of the Mughal Court, based on a catalogue raisonné of collections in the National Museums of London'. The Professor is sharing the supervision with Mr. H. W. M. Hodges of the Conservation Department. Mr. Mirza has been awarded a British Council scholarship. Other research students were registered at the School of Oriental and African Studies.

Courses of lectures on Indian Numismatics and on the History and Geography of India were attended by a number of students from various schools of the University. Visits to the national museums also were well attended. Expeditions were made during term to Canterbury, Leith Hill and Chichester Downs and during vacations to St. Davids, Charmworth Forest and Kinlochewe, students from this and other Universities participating. It is hoped to expand this programme during the coming year, but transport and accommodation remain a major problem.

Dr. F. R. Allchin, now Lecturer in Indian Studies at Cambridge continued to work both at the Institute and at the School of Oriental and African Studies and further progress was made on the organisation of the pottery and photographic collections.

PREHISTORIC EUROPEAN ARCHAEOLOGY

Professor: J. D. Evans, M.A., Ph.D., F.S.A.

Lecturer: F. R. Hodson, M.A., Ph.D.

Special Lecturer in Central and Eastern European Prehistory: T. Sulimirski, Jur.D., Ph.D.(Lwow), Hon.F.S.A.

There were 9 full-time students registered for the Postgraduate Diploma, 7 of

these being in their first year, 2 in their second year. Of the latter, C. Taylor obtained the Diploma in the June examination. Three of the first-year students withdrew, one of them, C. Platt, having been appointed Research Assistant in the Department of History in the University of Leeds.

Six students were registered for higher degrees, as follows:—

Ph.D.

R. R. Mackay (Faculty of Arts (*part-time*)): Beaker domestic sites in Britain with special reference to East Anglia.

D. Britton (Faculty of Arts): Some aspects of the metal industry in Prehistoric Europe, especially in Britain.

P. J. Ucko (Faculty of Arts): The Prehistoric Anthropomorphic Figurines of the Ancient Near East and the Aegean.

M.A.

P. C. Ozanne (Faculty of Arts): Iron Age in Western Britain.

D. W. Head, Miss (Faculty of Arts): Essex Bronze Age.

G. Pike, Mrs. (Faculty of Arts): Transport in the Western Mediterranean Region in pre-Roman Times.

E. Coult, Mrs. (Faculty of Arts): Post-Palaeolithic Stone Industries of Gt. Britain.

Teaching was also provided for 3 Occasional and 10 Inter-collegiate students.

The Professor continued work on the Neolithic site at Knossos during the Summer Vacation of 1959. Excavations lasted for six weeks and the bottom of the deposit was reached at one point. Three students from the Department took part in this work. In May, 1960, Professor Evans lectured to the British School at Athens on the results of the first two seasons' work at Knossos.

Publications

By Professor Evans:

Various reviews.

By Dr. Hodson:

'Reflections on the ABC of the British Iron Age', *Antiquity,* 135 (Sept., 1960) pp. 138-40.

Various reviews.

By Dr. Sulimirski:

Polska Przedhistoryczna, Part II, 234 pp. (London) (1959).

ARCHAEOLOGY OF THE ROMAN PROVINCES

Reader: S. S. Frere, M.A., F.S.A.

There were 6 students working in the Department. One, W. Manning, successfully took the June examination for the Postgraduate Diploma. The was one occasional student.

Four candidates were registered for higher degrees as follows:—

Ph.D.

M. Rennie, Miss (Faculty of Arts): Roman pottery of the Severn Basin.

M.A.

J. Alcock, Miss (Faculty of Arts (*part-time*)): Romano-British religion.
H. F. Cleere (Faculty of Arts (*part-time*)): Romano-British iron.
A. Birchall, Miss (Faculty of Arts): The Belgae.

Regular courses of lectures on Roman Britain and on the Western Empire were given and were attended by a total of 25 Inter-collegiate students.

Work was continued on the pottery from Roman and Medieval Canterbury and on the Roman wall-plaster, pottery and small finds from Verulamium. Additions have also been made to the card-index of Romano-British objects, including photographs of objects in Peterborough Museum and photographs of mosaics, the latter made available by Miss Brennand. A beginning has also been made with a photographic card index of pre-Roman coinage and work has been done on coin-collections from Gravesend, Hull and Scunthorpe Museums.

The Reader continued his field work activity. He directed another long season of excavation at Verulamium in August-September, 1959. In the Easter Vacation with Dr. J. K. St. Joseph he continued the annual survey of Roman military sites in Wales and participated in the excavations of the newly discovered Roman fort at Great Casterton in Lincolnshire. At the end of the summer term, 1960, he directed excavations on a site due for re-development at Canterbury. The Reader also supervised the organisation of a new site-museum at the Roman villa at Bignor, Sussex, which was carried out by Mr. S. Rees-Jones of the Conservation Department.

In addition to 14 public lectures in various part of the country the Reader gave an extra-mural course of 24 lectures on Roman Britain at the Institute.

Publications

By Mr. Frere:

'Verulamium 1959: fifth interim report', *Antiquaries Journal*, XL (1960), pp. 1-21.
Town and Country in Roman Britain', *Past and Present*, 16 (Nov. 1959), pp. 1-9.

WESTERN ASIATIC ARCHAEOLOGY

Professor: M. E. L. Mallowan, C.B.E., M.A., D.Lit., F.B.A., F.S.A.
Lecturer in Palestinian Archaeology: Miss K. M. Kenyon, C.B.E., M.A., D.Lit., F.B.A., F.S.A.
Lecturer: Mrs. K. R. Maxwell-Hyslop, F.S.A.

Six students were registered for the Postgraduate Diploma in Western Asiatic Archaeology, 3 for Mesopotamia and 3 for Palestine. Of these, E. von Gericke (Mesopotamia) and Miss L. Witherall (Palestine) were successful in the examinations in June.

Five students were registered for higher degrees as follows:—

Western Asiatic

Ph.D.

H. Browne, Miss (Faculty of Arts): The Archaeology of the Early Dynastic Period

M.A.

A. Durrani (Faculty of Arts): Connexions between the Indus Valley and Mesopotamia.

Palestinian

Ph.D.

F. James, Mrs. (Faculty of Arts): Bethshan in the Late Bronze Ages and Early Iron Age.

C. Epstein, Miss (Faculty of Arts): The Bichrome Pottery of Palestine in the Late Bronze Age and its connexions.

M.A.

R. Dajani (Faculty of Arts): The culture of eastern Jordan in the Iron Age.

Classes of 12 students each attended the special course on the Archaeology of Assyria and Syria, 2,000-612 B.C. and on the Rise of Civilisation in the Near East. A class of 12 students also attended the sessional course on the Archaeology of Palestine from the Neolithic Period to the Post-Exilic Period.

The Department continued its research activities. Dr. Kenyon visited Palestine early in 1960 in connexion with the work of the British School, of which she is Director, and was engaged on the publication of excavations at Jericho and at Sabratha, Tripolitania. Mrs. Maxwell-Hyslop continued her work on the relationship of Etruscan metallurgy with that of the Orient in the 8th and 9th centuries, B.C., in connexion with which she visited Istanbul, Ankara and Samos.

Extra-mural lectures included one by Mrs. Maxwell-Hyslop at Edinburgh under the Munro Lectureship Foundation.

Publications

By Professor Mallowan:

Editor, *Iraq*, Vols. XXI, Part II (1959) & XXII (1960) (Woolley Memorial Volume).

'The excavations at Nimrud (Kalhu), 1958' *Iraq* XXI, Part II, pp. 93-7.

'Memories of Ur', *Iraq* XXII, pp. 1-19.

Twenty articles on various Western Asiatic subjects for *Encyclopaedia Britannica* and *Chambers Encyclopaedia*.

By Dr. Kenyon:

Excavations at Jericho, Vol. I, 583 pp. (1960).

Archaeology in the Holy Land, 362 pp. (1960).

'Jericho and the Origins of Agriculture'. *The Advancement of Science*, Vol. XVII, No. 66 (July, 1960) pp. 118-20.

Various articles in *Hastings Dictionary of the Bible* and *Encyclopaedia Britannica*.

By Mrs. Maxwell-Hyslop:

'The Ur Jewellery. A re-assessment in the light of some recent discoveries'. *Iraq*, XXII (1960), pp. 105-115.

DRAWING AND SURVEYING

Lecturer: H. M. Stewart, B.A.

The number of students attending courses was: *Drawing*: 25 (8 Diploma, 12 Conservation, 3 Higher Degree, 2 Occasional); *Surveying*: 16 (8 Diploma, 4 Conservation, 2 Higher Degree, 2 Occasional).

The scope of courses given in the Department has recently been increased by the institution of full-time teaching. In the case of drawing instruction for Conservation students an extension from one to three terms now goes a considerable way to meet the requirements of museum authorities. It has also been arranged to include during the coming session some instruction in surveying for such students, a step which had already been anticipated in their assistance in the Field Course surveys.

PHOTOGRAPHY

Lecturer: M. B. Cookson.

Assistant: Mrs. V. M. Conlon.

Eighteen students received instruction in the Department, of whom 7 were Diploma students, 7 Conservation students, 3 Occasional students and 1 Intercollegiate student.

The Department made its usual contribution to research. The Lecturer again carried out the photography for the Verulamium excavations, as well as for three smaller sites. Advice on photographic techniques was given to an archaeological expedition to Syria and to members of the Underwater Expedition to

Turkey in which the Librarian participated. In addition, details of the layout of the photographic laboratory were supplied to the Department of Antiquities, Israel and to the Smithsonian Institution; and continuing interest in the Department and its working was shown by the number of visitors from overseas. The Department also participated in the British Council Conservation Course in July.

The Lecturer gave a number of external lectures on archaeological photography and attended two conferences in London. Parties of students were taken to the laboratories of Kodak, Ltd. and of Ilford, Ltd. and to the School of Graphic Arts. Teachers in photography from other schools came to see the exhibited work of the Technical and Diploma students and expressed themselves as very favourably impressed by the results.

The following additional equipment was purchased for student use:—(1) one ½-plate camera; (2) one ¼-plate camera; (3) two miniature enlargers; (4) one new metal tripod. A new sound/ciné projector has also been installed in the lecture-theatre.

CONSERVATION

Lecturer-in-Charge: Miss Ione Gedye, B.A., F.I.I.C.
Lecturer: H. M. W. Hodges, F.I.I.C.

Twenty-six internal students worked in the Department, of whom 13 followed the Conservation course, 5 (2 part time) being in their second year. The remaining 13 were Diploma and Higher Degree students and included two from University College. In addition special courses were given to Museum Assistants from the Corinium Museum, Cirencester and the Ashmolean Museum, Oxford.

As in previous years work of instructional value to the students was undertaken for a number of museums and excavations. Amongst the museums were Alton (Curtis Museum), Aylesbury, Lewes, Newbury and the Soane Museum, Lincoln's Inn. For the last a beginning was made on the treatment and repair, where necessary, of Sir John Soane's collection of Greek vases and architectural models. Excavations were represented by Canterbury, Verulamium, Great Casterton (Lincs.), Brill (Bucks.) and Nimrud, as well as by the Institute's own Field Course. Help was also given with material from several Ministry of Works excavations and with teaching material for Exeter University. One of the more interesting problems related to the cleaning of two inlaid Saxon buckles, the decoration of which was only revealed by radiography. The inlay was satisfactorily exposed by the removal of the corrosion with dental burrs and needles. Five fragmentary Saxon buckets also produced some problems and missing wooden parts were finally reconstructed using balsa wood. The value of work of this sort cannot be overstressed for the variety of experience that it provides for

students, while at the same time safeguarding and preserving important archaeological material.

As part of the training in electrotyping a small number of electrotypes of coins has been produced for various museums.

Miss S. N. Shaw was appointed to the staff for one year on the basis of a special grant to help with the restoration of the wall plaster from Verulamium.

A scale-model of the Neolithic village of Aichbühl was made from the published records for the Prehistoric Department, as well as a three-dimensional 'exploded' scale relief-map of the Weald and the Thames Valley for the Environmental Department.

The Department's thanks are due to Dr. A. E. Werner, Keeper of the Research Laboratory of the British Museum, for acting as external examiner for the written examination in Conservation—work which he has kindly consented to continue in future—and for help in other ways. Thanks are also due to Mr. S. Rees-Jones of the Courtauld Institute and to Mr. A. Rixon of the British Museum (Natural History) for their kindness in instructing the students in the work of their departments.

The Department continues to derive benefit from its close association with the United Kingdom Group of the International Institute for the Conservation of Historic and Artistic Works. The monthly meetings of the Group, held at the Institute, are attended by Conservation students, who are thus able to hear about current work in conservation as well as having opportunities of visiting other laboratories. Mr. Hodges was elected a Fellow of the International Institute of Conservation.

At the request of the British Council, the lecturers co-operated with Dr. Werner in organising a fortnight's course for overseas conservators, on the Conservation of Archaeological Material. The course, which was over-subscribed, was based on the Institute and was so successful that the British Council has asked that a similar course may be held in 1963.

Mr. Hodges again took part in a conservation course for the Museums Association and acted as an examiner; he has been asked also to contribute to one of the Association's conservation handbooks. With the help of Mrs. R. Barton of the Environmental Department he examined the possibilities of the use of thin sections in the study of early pottery techniques and was invited to read a paper to the Prehistoric Society on the outcome of this work.

Publications

By Mr. Hodges:

'Moulds of the Bronze Age from the British Isles, Part I'.
Sibrium, 4 (1959) pp. 129-37.

LIBRARY

Librarian: Miss J. du Plat Taylor, F.S.A.
Assistant Librarian: Miss G. Talbot, M.A.
Collections Clerk: Miss J. Philips, B.A.

During the year work proceeded slowly with the incorporation of pamphlets from the Gordon Childe Bequest. The Lantern Slide collection was also enriched by the gift from Dr. J. W. and Miss E. Crowfoot of the collection of slides on textiles and pottery made by the late Mrs. Grace Crowfoot. Most of these have now been added to the Institute's Technical section.

During the summer the Librarian was granted three months special leave (which included her vacation) to take part in the Pennsylvania University Museum Underwater Expedition to Turkey. In her absence during June, Miss P. Thomson assisted in the Library and with stock-taking. The Assistant Librarian took part in excavations at Petra, Jordan, during the vacation.

The following is a summary of the additions made during the year:—

Books		303	*Pamphlets*		263
Exchanged	69		Purchased	11	
Presented	139		Presented	221	
Purchased	95		Exchanged	31	
Periodicals		231	*Lantern slides*		649
	Volumes bound		112		

Volumes lent totalled 4,125, the highest month being November (565), the lowest August (92). 41 works were borrowed from outside libraries and 25 lent. 4,388 lantern slides were lent.

The following have presented books, periodicals, pamphlets and slides: Algiers, Direction de l'Intérieur et de Beaux Arts; Dr. F. R. Allchin; E. Anati: F. K. Annable; Society of Antiquaries of London; A. M. ApSimon; the Austrian Institute; Mrs. Bickerdike; British Archaeological Association; R. Richmond Brown; J. J. Butler; Caracas, Comisión Indigenista; Miss Sonia E. Chadwick; CIBA Review; Dr. J. Desmond Clark; Professor K. de B. Codrington; Dr. I. W. Cornwall; Mrs. M. Cotton; Mrs. E. Coult; The Courtauld Institute; J. D. Cowen; Miss B. Craw; R. A. Crossland; Miss E. Crowfoot; Professor Raymond A. Dart; Erlangers, Ltd.; Professor J. D. Evans; W. A. Evans; Jan Filip; S. S. Frere; Miss I. Gedye; Dr. D. M. Lang; C. M. Lerici; D. G. Littman; F. D. McCarthy; S. C. Malik; Grimes; Dr. D. B. Harden; Dr. H. Helbaek; H. W. M. Hodges; Institute of Classical Studies; Institute of Historical Research; Instanbul; Topkapi Sarayi Muzesi; Dr. K. M. Kenyon; James Kirkman; Miss C. Koopman; A. D. Lacaille; Dr. P.-R. Giot; Goldsmiths' Librarian, University of London; Professor W. F. T. G. Manby; I. D. Margary; Miss D. Marshall; J. V. S. Megaw; Dr. M. A.

Murray; M. W. Prausnitz; Miss E. Protonotariou; E. Pyddoke; J. R. dos Santos Júnior; Dr. Isobel Smith; Sudan Embassy, Information and Press Section; Professor T. Sulimirski; Dr. A. Sutcliffe; E. H. Swanson; Miss G. C. Talbot; Miss J. du Plat Taylor; D. R. Theocharis; A. C. Thomas; Professor S. P. Tolstov; Miss M. Varese; F. T. Wainwright; The Warburg Institute; Sir Leonard Woolley.

COMMITTEE OF MANAGEMENT, 1958-59.

The Vice-Chancellor (Dr. C. F. Harris).
The Chairman of Convocation (Dr. P. Dunsheath).
The Principal (Sir Douglas Logan).
Professor W. F. Grimes (*Director of the Institute*).
Professor Sir A. Blunt (*Director of the Courtauld Institute of Art*).
Professor E. G. Turner (*Director of the Institute of Classical Studies*).
Professor G. Bing (*Director of the Warburg Institute*).
Dr. D. B. Harden (*President of the Council for British Archaeology*). (or other representative).
Mr. J. D. Cowen (*President of the Prehistoric Society*). (or other representative).
Sir Mortimer Wheeler (*President of the Society of Antiquaries of London*). (or other representative).

Recognised or Appointed Teachers in cognate subjects, of Heads of Schools or Institutes in the University:—

Professor K. de B. Codrington
Professor W. B. Emery
Professor C. Daryll Forde
Dr. J. F. Lockwood
Dr. P. S. Noble
Professor C. M. Robertson
Professor A. H. Smith
Professor S. W. Wooldridge

Two members of the Academic Staff nominated by the Academic Board:

Professor M. E. L. Mallowan
Professor F. E. Zeuner

Five other persons:—

Mr. R. L. S. Bruce-Mitford
Professor J. G. D. Clark
Dr. E. G. M. Fletcher
Professor C. F. C. Hawkes
Professor D. McKie

(1959-1960)

as above, except for Professor G. Bing substitute
Professor E. H. J. Gombrich

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